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STRUCTURED ANALYSIS

REVIEW OF ILS ELEMENT E13

RELIABILITY, AVAILABILITY
AND MAINTAINABILITY

APJ 966-225

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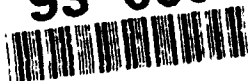**S** ELECTE
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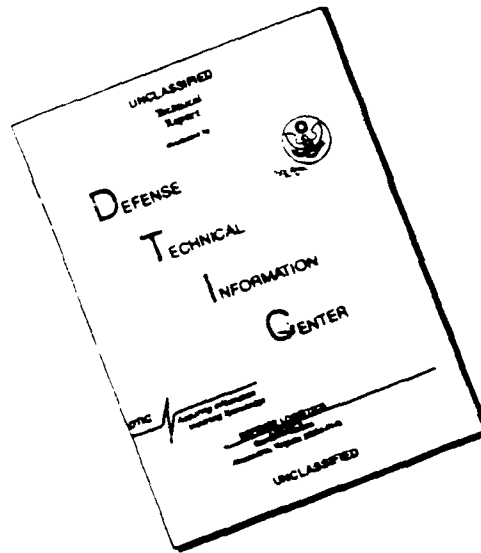
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STRUCTURED ANALYSIS

———

REVIEW OF ILS ELEMENT E13
RELIABILITY, AVAILABILITY
AND MAINTAINABILITY

under

CONTRACT DAAA21-86-D-0025

for

HQ US AMCCOM

INTEGRATED LOGISTIC SUPPORT OFFICE
AMSMC-LSP
ROCK ISLAND, IL

by

AMERICAN POWER JET COMPANY

RIDGEFIELD, NJ   **FALLS CHURCH, VA**

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report is one of a series presenting the Structured Analysis for the Logistic Support Analysis (LSA) Task and the Intergrated Logistic Support (ILS) Element. Included in this report is the System Analysis for the LSA Task and the ILS Element, comprises a description of the process being automated in terms which facilitate system design and subsequent programming. Also, the ILS Element EL13, "Reliability, Availability, and Maintainability", with the corresponding description of the processes, data flows, data stores, external entities involved on each DFD. An overview of the ILS Element Assessment procedures, and a guide to the overall RAM review process, as well as a brief working description of the Structured Systems Analysis Fundamentals.

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RELIABILITY, AVAILABILITY, AND MAINTAINABILITY, PROCESS FLOWS.

TABLE OF CONTENTS

LIST OF FIGURES

APJ, under contract to HQs, AMCCOM, has initiated the automation of the LSA Tasks (MIL-STD-1388-1) and the assessment of the ILS elements (AR 700-127). A major goal is to unify military and contractor approaches to the performance of ILS and LSA.

Detailed to meet all requirements of ILS and LSA, the automated process will continue to provide the flexibility in selecting tasks and elements to be addressed at each life cycle stage. A major advantage of this approach is to insure that the application of each task element is consistent with prescribed Army policies and procedures.

This report is one of a series presenting the Structured Analysis of the respective LSA Task and ILS Element. Structured Analysis comprises a description of the process being automated in terms which facilitate system design and subsequent programming. It is increasingly the preferred approach in both industry and Government.

This report contains the Data Flow Diagrams (DFDs) of ILS Element EL13, "Reliability, Availability, and Maintainability (RAM)", and provides definitions of the processes, data flows, data stores, and external entities involved on each DFD (Annexes A and B). The report provides an overview of the ILS Element Assessment procedures and a guide to the overall RAM review process.

To view this work in context, Annex C provides a brief working description of the Structured Systems Analysis fundamentals. The overview and certain portions of the introductory text are repeated verbatim in every report in this series so that each report is free standing.

This is a working document forwarded for review. Comments are welcome and should be directed to:

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ATTN: Scott Lerman
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PURPOSE

The purpose of this report series is to present the results of the APJ efforts under Contract DAAA21-86-D-0025 for coordination with the AMCCOM Program Manager prior to in-depth structured design of ILS and LSA functions and processes. "Reliability, Availability and Maintainability", (ILS Element E13) is addressed in this report.

BACKGROUND

The Department of the Army has a requirement for management control over contractor and Government agency response to the requirements of AR 700-127, "Integrated Logistic Support", and MIL-STD-1388-1, "Logistic Support Analysis". HQs AMCCOM has initiated action to structure each of the LSA tasks, the assessment of each ILS element, the form of the results, and the detailed processes to insure consistency with current Army policies, procedures, and techniques.

This approach (undertaken by AMCCOM and APJ) will insure uniformity in efforts and products, reproducibility of analysis, and a ell-defined structure which can be coordinated among all participants in the logistic process to arrive at common understanding and procedures.

SCOPE

This report summarizes the results of the Structured Systems Analysis for RAM, ILS review Element E13 and presents the associated Data Flow Diagrams (DFDs) developed from the Structured Analysis. The portions of the Data Dictionary relating to labels, names, descriptions, processes, data flows, data stores, and external entities are included in their present degree of completeness. (The Data Dictionary is a "living document" that evolves through the analysis and design process).

ILS Review Element E13 Description

ILS Review Element E13 provides an assessment of the reliability and maintainability programs and uses these results to determine the impact on the End item/Weapon System availability. The reliability and maintainability programs are assessed based on the End Item/Weapon Systems's logistics requirements, RAM management techniques, RAM application in relation to the design, and testing requirements. The impact of the results are measured against the inherent achieved, and operational availability values.

To the degree feasible, each of these RAM parameters have been addressed within the context of the overall ILS review system.

The ILS Review Element E13, "RAM" definitions from AR 700-127 are included as Annex A.

APPROACH

The APJ approach to structured design of an ILS review element is:

1. Scope the processes defined in AR 700-127 in the context of the other ILS elements.

2. Review the guidance provided in MIL-STD-1369, "Integrated Logistic Support Program Requirements" and DA PAM 700-55, "Instructions for Preparing the Integrated Logistic Support Plan".

3. Review the applicable Data Item Descriptions (DIDs) from the Acquisition Management Systems and Data Requirements Control List (AMSDL) published by the Department of Defense.

4. Review all source documents referenced in the AMSDL as applicable to the referenced DIDs of interest.

5. Apply staff experience in logistics support analysis to assure that the intent of the task has been addressed.

6. Validate results in discussions with Army activities and personnel directly involved in the applicable or related ILS review elements and/or LSA tasks.

Structured Analysis and preparation of Data Flow Diagrams (DFDs) was further assisted by the application of Structured Analysis software. Licensed by Index Technology Corporation, Excelerator provides for automated tracking of names, labels, descriptions, multiple levels of detail in the data flow diagrams, and industry standards in symbols and diagramming practices.

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The Data Flow Diagram is a tool that shows the flow of data, i.e., data flows from sources and is processed by activities to produce intermediate or final products.

The DFD provides a useful and meaningful partitioning of a system from the viewpoint of identification and separation of all functions, actions, or processes so that each can be introduced, changed, added, or deleted with minimal disruption of the overall program, i.e., it emphasizes the underlying concept of modularity and identifiable transformations of data into actionable products.

A series of eleven (11) DFDs have been developed to structure the ILS E13 subtask functions:

1.	E13	PAM
2.	E13.2A	Reliability
3.	E13.2A2B	Logistic Requirement
4.	E13.2A3B	Plans and Control
5.	E13.2A4B	Design and Evaluation
6.	E13.2A5B	Testing
7.	E13.3A	Maintainability
8.	E13.3A2B	General Requirements
9.	E13.3A3B	Plans and Controls
10.	E13.3A4B	Design and Analysis
11.	E13.4A	Availability

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case) through the identification number assigned in the lower right hand box. The Alpha codes indicate the level of indenture or explosion below the top level, i.e.,:

```
Top Level......................ILS DFD E13
     First Indenture..........ILS DFD E13.2A
     Second Indenture.........ILS DFD E13.2A7B
```

Each DFD makes reference to the basic ILS element it addresses, as well as the level of indenture (explosion) of the DFD. For example, the first or top level DFD, "E13", refers to the section in AR 700-127 which describes the review items. One of the processes (bubbles) on the top level diagram (E13.2) is expanded and identified as "E13.2A", a second level of E13 (Alpha "A" indicates the second level).

In turn, DFD E13.2A has a process (bubble) E13.2A7, "Procurement", which is further exploded on DFD E13.2A7B, a third level explosion of the basic DFD E13 (Alpha "B" indicates the third level explosion).

Four standard symbols are used in the DFD drawing (see Annex C - Figure 1).

A copy of each DFD is presented in Annex B, accompanied by the Data Dictionary process elements. Each entry made in the DFDs has a corresponding entry in the Data Dictionary.

This presents only those Data Dictionary entries necessary for the coordination of the overall concept and details of the processes. To facilitate review of the diagrams, data flow identifications, process, and data store descriptions are provided. As noted above, they will continue to evolve and be expanded in the System Design phase.

```
┌─────────────────────────────┐
│                             │
│        ANNEX A              │
│                             │
│     ILS ELEMENT E 13        │
│                             │
└─────────────────────────────┘
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E-13 RAM
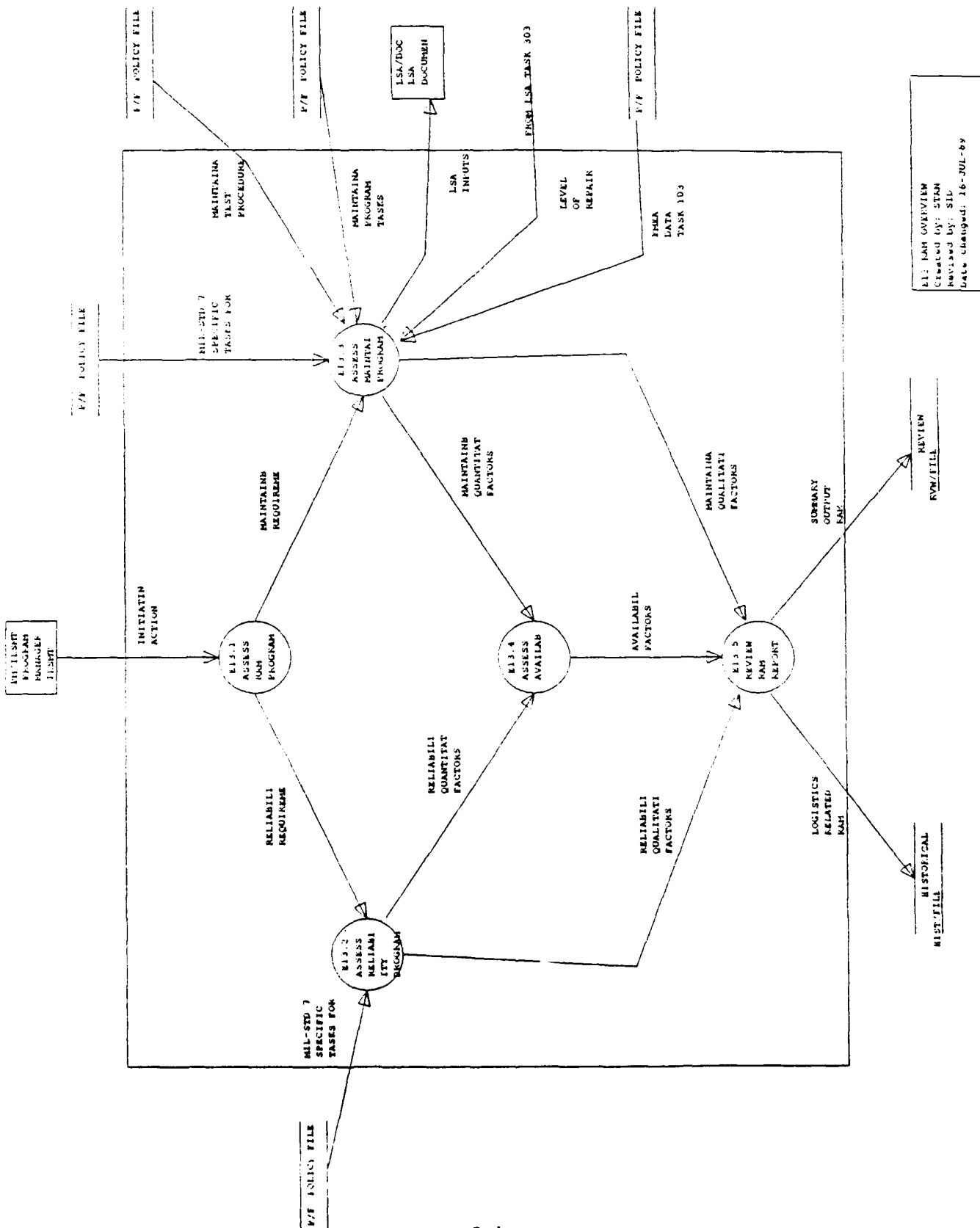
a. Reliability growth plan.
b. System readiness objectives.
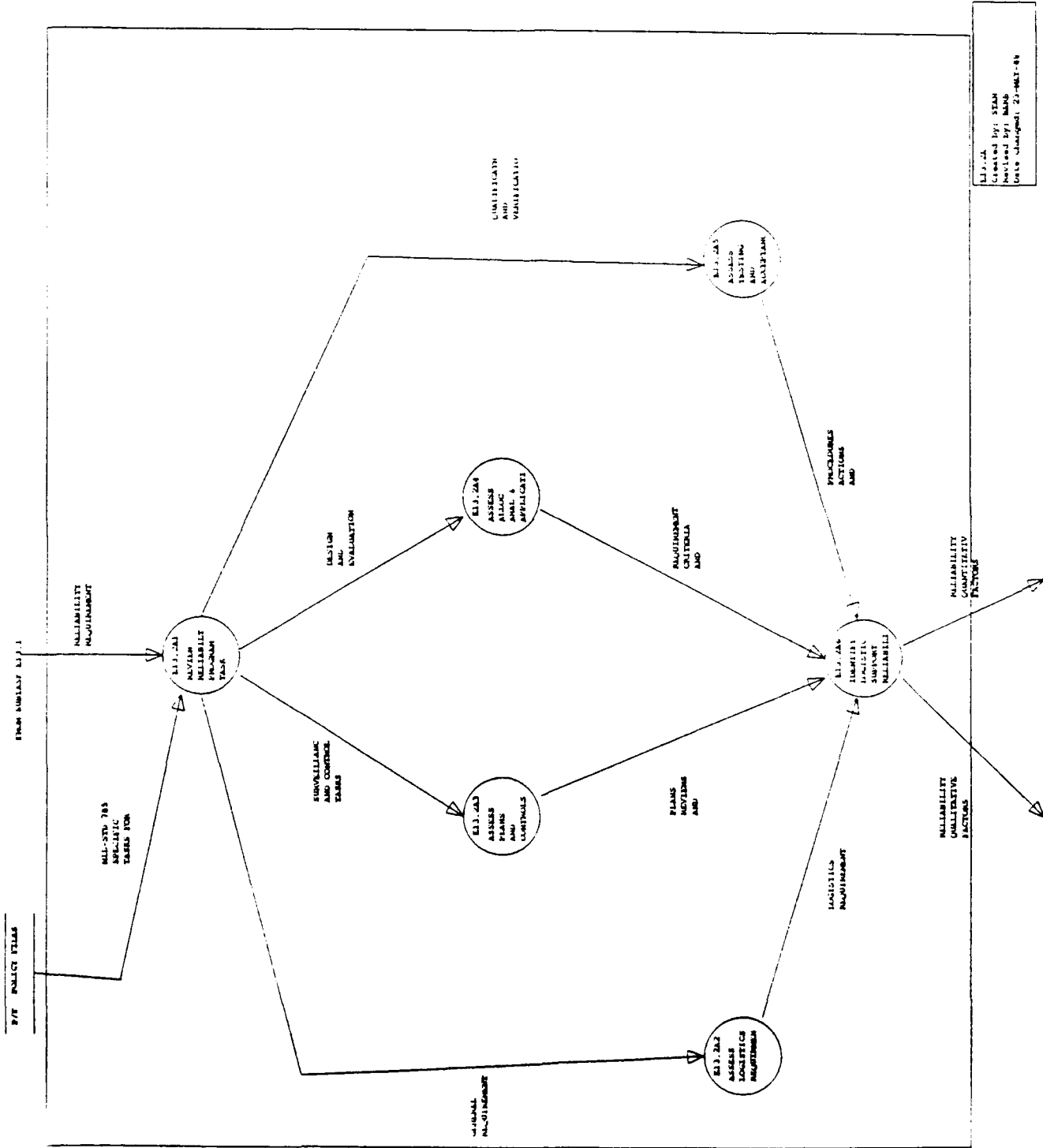c. Test planning.
d. Durability.
e. Test results.

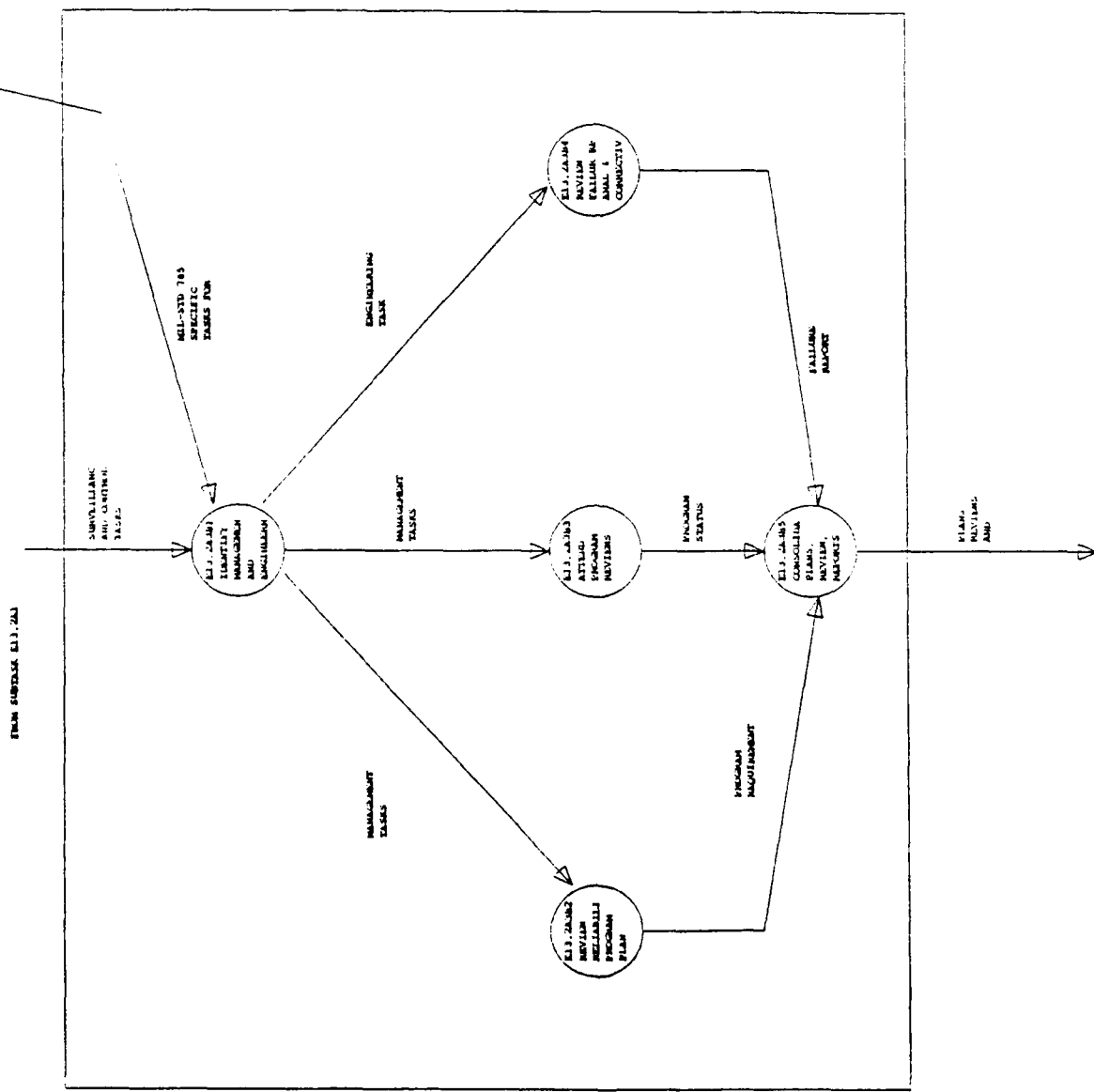---

1/ Abstracted verbatim from AR 700-127, March 17, 1988
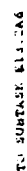
ANNEX B

ILS RIVIEW ELEMENT E13

ILS ASSESSMENT FOR RELIABILITY, AVAILABILITY & MAINTAINABILITY
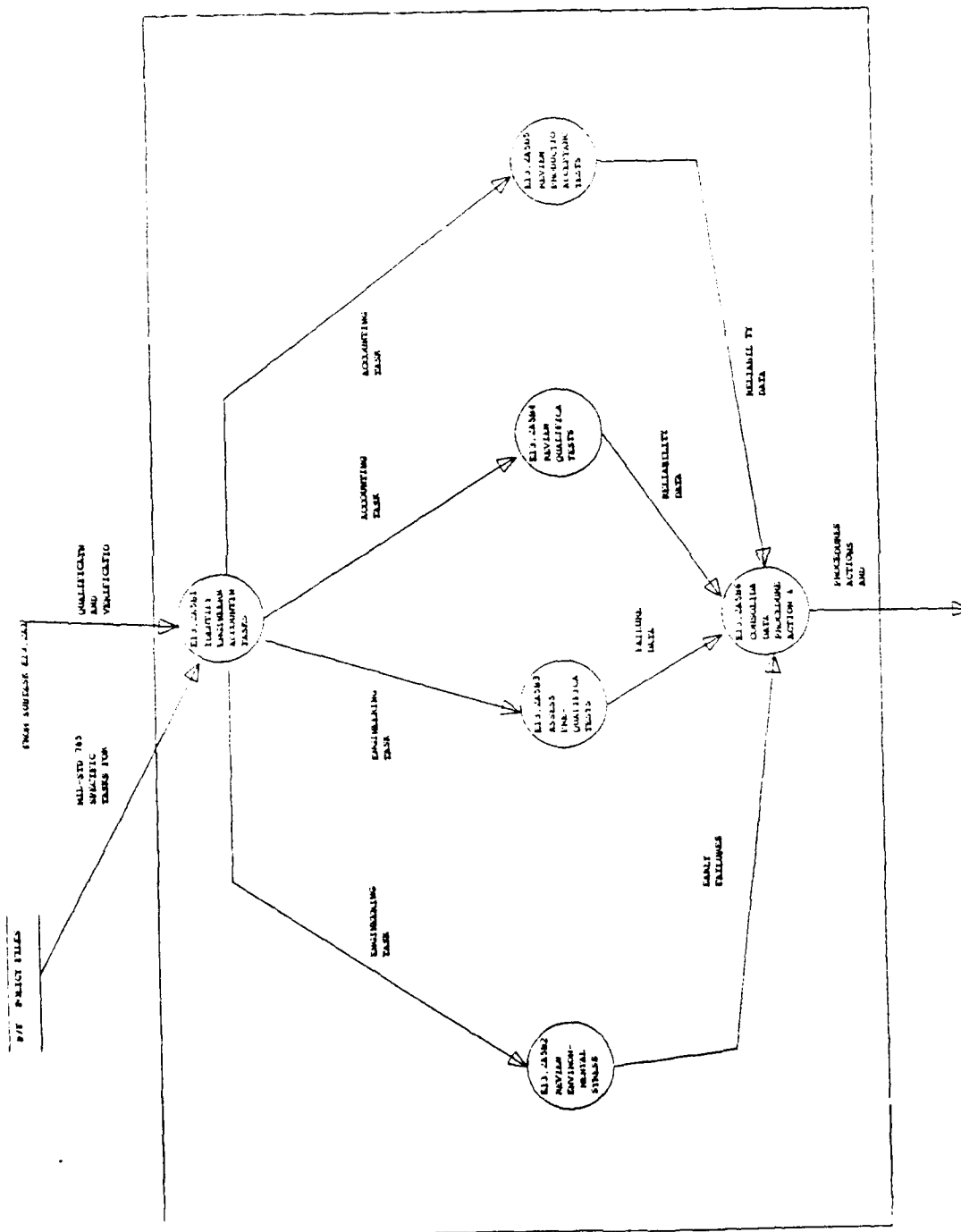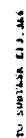## DATA FLOW DIAGRAMS AND PROCESS DATA DICTIONARY

P/P POLICY FILE

P/P POLICY FILE

LSA/DOC
LSA
DOCUMEN

FROM LSA TASK 303

P/P POLICY FILE

MAINTAINA
TEST
PROCEDURE

MAINTAINA
PROGRAM
TASKS

LSA
INPUTS

LEVEL
OF
REPAIR

FMEA
DATA
TASK 103

P/P POLICY FILE

MIL-STD 7
SPECIFIC
TASKS FOR

E13.3
ASSESS
MAINTAI
PROGRAM

MAINTAINS
QUANTITAT
FACTORS

MAINTAINS
QUALITATI
FACTORS

SUMMARY
OUTPUT
RAM

REVIEW

RVW/FILE

MAINTAINS
REQUIREME

INITIATIN
ACTION

INITIENT
PROGRAM
MANAGER
TEAM

E13.1
ASSESS
RAM
PROGRAM

E13.4
ASSESS
AVAILAB

AVAILABIL
FACTORS

E13.5
REVIEW
RAM
REPORT

LOGISTICS
RELATED
RAM

HISTORICAL

HIST/FILE

RELIABILI
REQUIREME

RELIABILI
QUANTITAT
FACTORS

RELIABILI
QUALITATI
FACTORS

E13.2
ASSESS
RELIABI
ITY
PROGRAM

MIL-STD 7
SPECIFIC
TASKS FOR

P/P POLICY FILE

P/P POLICY FILE

E13 RAM OVERVIEW
Created by: STAN
Revised by: SID
Date changed: 16-JUL-89

B-4

B-9

Number	Label	Description

E13.1   ASSESS   ACRONYMS:
RAM   R&M = RELIABILITY & MAINTAINABILITY
PROGRAMS   RAM = RELIABILITY, AVAILABILITY & MAINTAINABILITY
SRO = SYSTEM READINESS OBJECTIVES
WBS = WORK BREAKDOWN STRUCTURE
LOGISTICS RELATED ASSESSMENT OF RAM PROGRAMS MUST BE CONDUCTED TO ENSURE
THAT THE NEW SYSTEM/EQUIPMENT IS BEING DESIGNED AND DEVELOPED TO RESULT
IN ECONOMICAL OPERATION AND MAINTENANCE WITHIN THE SCOPE OF LOGISTIC
CONCEPTS AND POLICIES. RELIABILITY (R) AND MAINTAINABILITY (M)
REQUIREMENTS AND PROGRAMS SUPPORT THE ACHIEVEMENT OF SYSTEM READINESS
OBJECTIVES (SROs) WHICH ARE ESTABLISHED BY THE COMBAT DEVELOPER IN
COORDINATION WITH THE MATERIEL DEVELOPER. OPERATIONAL R&M REQUIREMENTS
ARE DEVELOPED, BASED ON SROs AND THE METHODOLOGY USED TO DEVELOP THE
REQUIREMENTS IS DOCUMENTED IN THE RAM RATIONALE REPORT.
/AVAILABILITY (A) IS A FUNCTION OF R&M AND THE SUPPORT CONCEPT AND IS NOT
DIRECTLY TESTED FOR AND MEASURED./ AR 702-2 MANDATES THE USE OF
OPERATIONAL RAM REQUIREMENTS IN REQUIREMENTS DOCUMENTS THAT RELATE
DIRECTLY TO OPERATING AND SUPPORT COSTS. RAM PARAMETERS APPROPRIATE
FOR CONTRACTING PURPOSES AND STATED AS SPECIFIED VALUES ARE DERIVED
FROM OPERATIONAL RAM REQUIREMENTS STATED IN REQUIREMENT DOCUMENTS BY
THE MATERIEL DEVELOPER'S RAM ENGINEERING ACTIVITY. THE SPECIFIED
VALUES ARE USED AS DESIGN REQUIREMENTS FOR SYSTEM LEVEL, CRITICAL LOWER
LEVEL WORK BREAKDOWN STRUCTURE (WBS) ELEMENTS, AND TO THE LOWEST WBS
LEVEL NECESSARY TO CONTROL RAM CHARACTERISTICS OF REPAIR PART
PROCUREMENTS AND RECONDITIONED MATERIEL REQUIREMENTS.

E13.2   ASSESS   SINCE RELIABILITY (R) IS **THE PROBABILITY THAT AN ITEM CAN PERFORM** ITS
RELIABIL- **INTENDED FUNCTIONS (FAILURE FREE** - PERFORM WITHIN THEIR SPECIFIED
ITY   LIMITS) **FOR A SPECIFIED TIME INTERVAL UNDER STATED CONDITIONS,**
PROGRAM   RELIABILITY IS DIRECTLY RELATED TO THE DEMAND FOR MAINTENANCE AND THE
DEMAND FOR LOGISTICS SUPPORT. ASSESSMENT OF THE R PROGRAM MUST
INTERFACE WITH LOGISTIC SUPPORT PLANNING AND EXECUTION TO ENSURE
PREVENTION, DETECTION, AND CORRECTIONS OF DESIGN DEFICIENCIES, WEAK
PARTS AND WORKMANSHIP DEFECTS WHICH CREATE DEMAND FOR MAINTENANCE
MANPOWER AND LOGISTIC SUPPORT.
SEPARATE REQUIREMENTS ARE ESTABLISHED FOR EACH SYSTEM RELIABILITY
PARAMETER AND IS TRANSLATED INTO BASIC RELIABILITY REQUIREMENTS FOR
SUBSYSTEMS, EQUIPMENTS, COMPONENTS, AND PARTS. ALL RELIABILITY DATA
USED FOR SUPPORT WILL BE BASED ON AND TRACEABLE TO THE OUPUTS OF THE
RELIABILITY PROGRAM.

E13.2A1   REVIEW   REVIEW OF THE SELECTED TASKS TO BE ACCOMPLISHED FOR THE R PROGRAM MUST
RELIABILTY INCLUDE LOGISTICS REQUIREMENTS AND AN APPROPRIATE MIX OF TASKS FOR
PROGRAM   SURVEILLANCE AND CONTROL, FOR DESIGN AND EVALUATION, AND FOR
TASK   QUALIFICATION AND VERIFICATION. TASK SELECTION MUST BE TAILORED TO FIT
SELECTION THE NEEDS OF THE PARTICULAR SYSTEM OR EQUIPMENT PROGRAM TYPE, THE PHASE
OF THE ACQUISITION PROGRAM, AND THE FUNDING CONSTRAINTS. RATIONALE FOR
TASKS SELECTED SHOULD BE AVAILABLE FOR REVIEW AND JUSTIFICATION.

Name	Label	Description
E13.2A2	ASSESS LOGISTICS REQUIRMENT	THE ASSESSMENT OF LOGISTICS RELATED RELIABILITY REQUIREMENTS IS CONCERNED WITH QUANTITATIVE PARAMETERS WHICH ARE DEFINED IN UNITS OF MEASUREMENT DIRECTLY RELATED TO OPERATIONAL READINESS, MAINTENANCE DEMAND, AND THE DEMANDS ON THE SUPPLY SYSTEM FOR SPARE AND/OR REPAIR PARTS. NOTE THAT OPERATIONAL REQUIREMENTS FOR EACH PARAMETER INCLUDES THE COMBINED EFFECTS OF ITEM DESIGN AND QUALITY OF MANUFACTURE WHICH IS THE INHERENT OR BUILT-IN RELIABILITY PLUS ANY DEGRADATION FROM OPERATION, MAINTENANCE AND REPAIR IN THE OPERATIONAL ENVIRONMENT. IT IS THEREFORE ESSENTIAL THAT THE USE REQUIREMENTS BE ANTICIPATED AND CONSIDERED IN THE DESIGN CONCEPT, THE DEVELOPMENT PROGRAM, THE MANUFACTURING PROCESS, AND THE RELIABILITY TEST PROGRAM.
E13.2A2B1	IDENTIFY LOGISTICS RELATED REQUIRE- MENTS	QUANTITATIVE LOGISTICS RELATED RELIABILITY REQUIREMENTS ARE MEASURES OF TOTAL USE DURATION (I.E., OPERATING HOURS, CYCLES, DISTANCE TRAVELED, ROUNDS FIRED) DIVIDED BY THE TOTAL NUMBER OF EVENTS OR ACTIONS DURING A STATED PERIOD AND UNDER STATED CONDITIONS. THERE ARE RELIABILITY PARAMETERS TO QUANTIFY READINESS, MAINTENANCE ACTIONS AND THE COST OR QUANTITY OF PARTS AND DEMAND FOR MAINTENANCE RESOURCES.
E13.2A2B2	ASSESS OPERATIONL READINESS PARAMETERS	ACRONYMS: MTBF = MEAN TIME BETWEEN FAILURE THE MEASURE RELATED TO READINESS IS THE MEAN TIME BETWEEN DOWNING EVENTS. IT IS EQUAL TO THE TOTAL USE DURATIONS DIVIDED BY THE NUMBER OF EVENTS IN WHICH THE SYSTEM/EQUIPMENT BECOMES UNABLE TO INITIATE ITS MISSION DURING A STATED PERIOD. MEAN TIME BETWEEN FAILURE (MTBF) IS A BASIC MEASURE OF RELIABILITY FOR REPAIRABLE SYSTEMS AND IS THE MEAN USE DURATION DURING WHICH ALL PARTS OF THE SYSTEM PERFORM WITHIN THEIR SPECIFIED LIMITS, DURING A PARTICULAR MEASUREMENT INTERVAL, UNDER STATED CONDITIONS.
E13.2A2B3	ASSESS MAINTE- NANCE DEMAND PARAMETERS	MAINTENANCE DEMAND RELIABILITY PARAMETERS INCLUDE MEAN TIME BETWEEN ESSENTIAL MAINTENANCE ACTIONS WHICH INDICATES THE FREQUENCY FOR ESSENTIAL/NON-DEFERRABLE MAINTENANCE SUPPORT. IT DOES NOT INCLUDE CREW MAINTENANCE SUPPORT. IT DOES NOT INCLUDE CREW MAINTENANCE COMPLETED WITHIN A SPECIFIED NUMBER OF MINUTES AND MAINTENANCE DEFERRABLE TO THE NEXT SCHEDULED MAINTENANCE. MEAN TIME BETWEEN MAINTENANCE ACTIONS AND MEAN TIME BETWEEN UNSCHEDULED MAINTENANCE ACTIONS ARE ALSO MAINTENANCE DEMAND PARAMETERS. IT IS EVIDENT THAT FOR EACH FAILURE WHICH OCCURS DURING THE OPERATIONAL LIFE OF AN ITEM, A MAINTENANCE ACTION IS REQUIRED TO RESTORE THE ITEM TO A SPECIFIED CONDITION.
E13.2A2B4	ASSESS LOGISTIC SUPPORT DEMAND PARAMETERS	THE RELIABILITY PARAMETER TO MEASURE THE DEMAND ON LOGISTICS IS MEAN TIME BETWEEN DEMANDS WHICH RELATES TO DEMANDS ON THE SUPPLY SYSTEM AND ALSO MEAN TIME BETWEEN REMOVALS RELATING TO THE NUMBER OF REMOVALS OF SPECIFIED COMPONENTS OR ASSEMBLIES FOR A PARTICULAR MEASUREMENT INTERVAL.

Name	Code	Description

E13.2A2B5   CONSOLIDAT   CONSOLIDATED LOGISTICS PARAMETERS WITHIN THE RELIABILITY PROGRAM ARE
             LOGISTICS   BASED ON INPUTS FROM PROCESSES TO ASSESS OPERATIONAL READINESS,
             PARAMETERS   MAINTENANCE, AND LOGISTIC SUPPORT.

E13.2A3   ASSESS   ACRONYMS:
             PLANS
             AND   SOW - STATEMENT OF WORK

             CONTROLS   ASSESSMENT OF THE PLANS AND CONTROLS FOR A RELIABILITY PROGRAM ON A NEW
                           SYSTEM/EQUIPMENT MUST INCLUDE THE IDENTIFICATION OF MANAGEMENT AND
                           ENGINEERING TASKS THAT ARE SPECIFIED IN THE STATEMENT OF WORK (SOW) TO
                           BE ACCOMPLISHED BY THE CONTACTOR AND/OR GOVERNMENT ACTIVITIES AND THAT
                           WILL PROVIDE ESSENTIAL MANAGEMENT INFORMATION. THESE TASKS MUST BE
                           SELECTED AND TAILORED ACCORDING TO THE TYPE OF ITEM (SYSTEM, SUBSYSTEM,
                           OR EQUIPMENT) AND FOR EACH APPLICABLE PHASE OF THE ACQUISITION PROGRAM.

E13.2A3B1   IDENTIFY   IDENTIFICATION OF THE REQUIRED MANAGEMENT AND ENGINEERING TASKS FOR
             MANAGEMENT   SURVEILLANCE AND CONTROL OF THE RELIABILITY PROGRAM INCLUDES
             AND   DEVELOPMENT OF A RELIABILITY PROGRAM PLAN, REQUIREMENTS TO CONDUCT
             ENGINEERNG   PROGRAM REVIEW, AND TO ESTABLISH A CLOSED-LOOP FAILURE OPERATING SYSTEM.
             TASKS

E13.2A3B2   REVIEW   ACRONYMS:
             RELIABILIT
             PROGRAM   LSAP - LOGISTIC SUPPORT ANALYSIS PLAN
             PLAN
                           REVIEW OF THE RELIABILITY PROGRAM PLAN IS TO ASSURE THAT ALL MANAGEMENT
                           TASKS ARE IDENTIFIED AND WILL BE COORDINATED, AND THAT ACCOUNTING AND
                           ENGINEERING TASKS ARE ADEQUATELY DESCRIBED. SCHEDULES, MILESTONES, AND
                           RESPONSIBILITIES MUST ALSO BE REVIEWED TO ASSURE AN EFFICIENT
                           RELIABILITY PROGRAM WILL BE ESTABLISHED AND MAINTAINED TO SUPPORT
                           ECONOMICAL ACHIEVEMENT OF OVERALL PROGRAM OBJECTIVES.
                           OF PARTICULAR IMPORTANCE, ENSURE THAT DESCRIPTION AND PROCEDURES ARE
                           ESTABLISHED WHICH ASSURE THAT APPLICABLE RELIABILITY DATA DERIVED FROM
                           AND TRACEABLE TO THE SPECIFIED RELIABILITY TASKS ARE INTEGRATED INTO
                           THE LOGISTIC SUPPORT ANALYSIS PLAN (LSAP) AND REPORTED ON APPROPRIATE
                           LOGISTIC SUPPORT ANALYSIS DOCUMENTATION.
                           THE RELIABILITY PROGRAM MUST INTERFACAE WITH LOGISTIC SUPPORT PLANNING
                           AND EXECUTION TO ENSURE THAT EACH COMPLEMENTS THE OTHER AND WILL
                           ENHANCE THE ACHIEVEMENT OF AN AFFORDABLE AND SUPPORTABLE
                           SYSTEM/EQUIPMENT.

E13.2A3B3   ATTEND   ACRONYMS:
             PROGRAM   FMECA - FAILURE MODES EFFECTS AND CRITICALITY ANALYSIS
             REVIEWS
                           ATTENDANCE AND PARTICIPATION IN RELIABILITY PROGRAM REVIEWS AND IN
                           DESIGN REVIEWS WHICH INCLUDE RELIABILITY ITEMS IS REQUIRED TO EVALUATE
                           PROGRESS, CONSISTENCY, TECHNICAL ADEQUACY, AND ACCEPTABILITY OF DESIGN
                           RELIABILITY ANALYSIS, FAILURE ANALYSIS, AND CORRECTIVE ACTIONS WITH
                           THEIR EFFECTS ON LOGISTIC SUPPORT RESOURCES. PROGRESS AND STATUS OF
                           THE PARTS PROGRAM AND THE FAILURE MODES EFFECTS AND CRITICALITY
                           ANALYSIS (FMECA) ARE OF PARTICULAR IMPORTANCE FOR THEIR IMPACT ON
                           LOGISTIC SUPPORT.

Name   Label   Description
------------   ---------------   ----------   --

E13.2A3B4   REVIEW   ACRONYMS:
                 FAILUR RPT   FRACAS - FAILURE REPORTING, ANALYSIS AND CORRECTIVE ACTIONS.
                 ANAL &   LSAR - LOGISTIC SUPPORT ANALYSIS REPORT
                 CORRECTIVE
                 ACT   THE FAILURE REPORTING, ANALYSIS AND CORRECTIVE ACTION (FRACAS) IS
                              COVERED BY TASK 104 OF MIL-STD-785 TO ESTABLISH A CLOSED-LOOP FAILURE
                              REPORTING SYSTEM WITH PROCEDURES FOR ANALYSIS OF FAILURES TO DETERMINE
                              CAUSE, AND WITH DOCUMENTATION FOR RECORDING CORRECTIVE ACTION TAKEN.
                              NOTE THAT DATA FROM THE FRACAS IS UTILIZED AS LSAR INPUTS AND SHOULD BE
                              EMPLOYED EARLY IN THE SYSTEM/EQUIPMENT DEVELOPMENT FOR EFFECTIVE
                              RELIABILITY GROWTH.

E13.2A3B5   CONSOLIDAT OUTPUTS FROM THE RELIABILITY PROGRAM PLAN REVIEW, PROGRAM REVIEWS, AND
                 PLANS,   FRACAS ARE CONSOLIDATED AND PROVIDED AS INPUT TO THE PROCESS TO
                 REVIEW,   IDENTIFY LOGISTIC SUPPORT RELIABILITY REQUIREMENTS.
                 REPORTS

E13.2A4   ASSESS   THE ASSESSMENT OF RELIABILITY ALLOCATIONS, ANALYSIS AND PARTS
                 ALLOC   APPLICATION COVERS THE DESIGN AND EVALUATION TASKS OF A RELIABILITY
                 ANAL &   PROGRAM. NOTE THAT THE PROCESSES INVOLVED IN DESIGN ARE ITERATIVE AND
                 APPLICATIO ALSO MUST VARY AS TO DEPTH OF DETAIL AS THE DESIGN PROGRESSES FROM
                             PROPOSED TO SYSTEM AND SUBSYSTEM DETAILS.

E13.2A4B1   IDENTIFY   IDENTIFICATION OF REQUIRED MANAGEMENT, ENGINEERING AND ACCOUNTING TASKS
                 MANAGEMENT FOR THE DESIGN AND EVALUATION PORTION OF THE RELIABILITY PROGRAM
                 ENGINEERNG INCLUDES DEVELOPMENT OF RELIABILITY MODELS WITH PROCESSES TO DETERMINE
                 & ACCNTING PREDICTED AND APPORTIONED RELIABILITY VALUES, AS WELL AS ANALYSES FOR
                 TASKS   PARTS SELECTION AND EFFECTS ON LOGISTICS SUPPORT.

E13.2A4B2   REVIEW   THE RELIABILITY MODEL IS MATHEMATICAL AND BASED ON SYSTEM/SUBSYSTEM/
                 RELIABILIT EQUIPMENT FUNCTIONS FOR MAKING NUMERICAL APPORTIONMENTS AND ESTIMATES.
                 MODEL   THE MODEL OUTPUTS ARE EXPRESSED AS CONTRACTUAL RELIABILITY
                             REQUIREMENTS. REFER TO TASK 201 OF MIL-STD-785.

E13.2A4B3   REVIEW   SYSTEM QUANTITATIVE REQUIREMENTS MUST BE ALLOCATED OR APPORTIONED TO
                 RELIABILTY LOWER LEVELS TO ESTABLISH BASELINE REQUIREMENTS FOR DESIGNERS. REFER
                 ALLOCATION TO TASK 202 OF MIL-STD-785.

E13.2A4B4   ASSESS   ACRONYMS:
                 RELIABILIT   LSAR - LOGISTIC SUPPORT ANALYSIS REPORT
                 PREDICTION
                             ASSESSMENT OF PREDICTED BASIC RELIABILITY IS REQUIRED FOR A NEW SYSTEM/
                             SUBSYSTEM/EQUIPMENT TO MAKE A DETERMINATION OF WHETHER THESE
                             RELIABILITY REQUIREMENTS CAN BE ACHIEVED WITH A PROPOSED DESIGN.
                             PREDICTIONS WOULD BE UPDATED WITH ACTUAL EXPERIENCE AND TEST DATA WHEN
                             AVAILABLE, AND USED AS INPUT TO LSAR AND FOR MAINTENANCE AND LOGISTICS
                             SUPPORT PLANS. NOTE THAT WHEN PREDICTIONS FALL SHORT OF ALLOCATED
                             RELIABILITY REQUIREMENTS, ALTERNATIVES INCLUDING REDESIGN MUST BE
                             CONSIDERED. REFER TO TASK 203 OF MIL-STD-785.

Name	Label	Description

E13.2A4B5   EVALUATE   ACRONYMS:
                 FMECA

FMECA = FAILURE MODES, EFFECTS, AND CRITICALITY ANALYSIS
THE FAILURE MODES, EFFECTS, AND CRITICALITY ANALYSIS (FMECA) IS
CONDUCTED TO IDENTIFY POTENTIAL DESIGN WEAKNESSES BY CONSIDERATION OF
HOW A COMPONENT OR EQUIPMENT CAN FAIL, THE CAUSE FOR EACH FAILURE MODE,
AND THE EFFECTS OF EACH FAILURE, INCLUDING THE DEMAND FOR MAINTENANCE
AND LOGISTIC SUPPORT. REFER TO TASK 204 OF MIL-STD-785.

E13.2A4B6   ASSESS   ASSESSMENT OF THE PARTS CONTROL AND APPLICATION PROGRAM FOR SELECTION
                 PARTS   AND USE OF STANDARD PARTS MINIMIZES PARTS PROLIFERATION WITHIN THE ARMY
                 PROGRAM   SUPPLY SYSTEM AND INCREASES THE PROBABILITY OF ACHIEVING AND
                             MAINTAINING INHERENT EQUIPMENT RELIABILITY. REFER TO TASK 207 OF
                             MIL-STD-785.

E13.2A4B7   REVIEW   REVIEW OF RELIABILITY CRITICAL ITEMS INCLUDE THOSE ITEMS WHOSE FAILURE
                 RELIABILIT CAN SIGNIFICANTLY AFFECT SYSTEM AVAILABILITY AND TOTAL MAINTENANCE AND
                 CRITICAL   LOGISTIC SUPPORT COST. THESE ITEMS ARE PRIME CANDIDATES FOR FURTHER
                 ITEMS   ANALYSIS, TESTING, AND OTHER TECHNIQUES TO REDUCE THE RELIABILITY RISK.
                             REFER TO TASK 208 OF MIL-STD-785.

E13.2A4B8   ASSESS   ASSESSMENT OF THE LOGISTICS EFFECTS ON HARDWARE RELIABILITY INCLUDES
                 LOGISTICS   ANALYSIS AND TESTING FOR DETERIORATION FROM STORAGE, HANDLING,
                 EFFECTS   PACKAGING, TRANSPORTATION, MAINTENANCE, AND REPEATED EXPOSURE TO
                             FUNCTIONAL TESTING. RESULTS INCLUDE IDENTIFICATION OF SPECIAL
                             PROCEDURES FOR MAINTENANCE OR RESTORATION. REFER TO TASK 209 OF
                             MIL-STD-785.

E13.2A4B9   CONSOLIDAT RESULTS FROM THE PROCESSES E13.2A4B2 THROUGH B8 ARE CONSOLIDATED AND
                 DATA   PROVIDED AS REQUIREMENTS, CRITERIA, AND EFFECTS INPUT TO PROCESS
                             E13.2A6 FOR IDENTIFICATION OF LOGISTIC SUPPORT RELIABILITY
                             REQUIREMENTS.

E13.2A5   ASSESS   ASSESSMENT OF THE RELIABILITY PROGRAM TESTING AND ACCEPTANCE TASKS IS
                 TESTING   REQUIRED TO DISCLOSE DEFICIENCIES IN ITEM DESIGN, MATERIEL AND
                 AND   WORKMANSHIP; TO PROVIDE MEASURED RELIABILITY DATA; AND TO DETERMINE
                 ACCEPTANCE COMPLIANCE WITH QUANTITATIVE RELIABILITY REQUIREMENTS.

E13.2A5B1   IDENTIFY   ACRONYMS:
                 ENGINEERNG   TEMP = TEST AND EVALUATION MASTER PLAN
                 ACCOUNTING
                 TASKS   IDENTIFICATION OF TESTING TASKS INCLUDE TWO RELIABILITY ENGINEERING
                             TESTS AND TWO RELIABILITY ACCOUNTING TASKS WITH THE REQUIRED
                             INTEGRATION INSOFAR AS PRACTICAL AND WITH PROPER BALANCE ON TIMING AND
                             EMPHASIS FOR AN EFFECTIVE AND EFFICIENT PROGRAM.
                             NOTE THAT TESTS MUST BE INCORPORATED INTO AN APPROVED INTEGRATED TEST
                             AND EVALUATION MASTER PLAN (TEMP) AND IN ADDITION, A TEST PROCEDURES
                             DOCUMENT IS REQUIRED FOR EACH TYPE OF RELIABILITY TEST.

Name	Label	Description
E13.2A5B2	REVIEW ENVIRON- MENTAL STRESS SCREENING	ACRONYMS: ESS = ENVIRONMENTAL STRESS SCREENING ENVIRONMENTAL STRESS SCREENING (ESS) TESTS ARE CONDUCTED ON THE END ITEM AND ITEMS WHICH WILL BE SEPARATELY PROCURED AS SPARE OR REPAIR PARTS SO THAT EARLY FAILURES, DUE TO WEAK PARTS, WORKMANSHIP, DEFECTS, AND OTHER NON-CONFORMANCE ANOMALIES CAN BE IDENTIFIED AND REMOVED FROM THE EQUIPMENT. REFER TO TASK 301 OF MIL-STD-785.
E13.2A5B3	ASSESS PRE- QUALIFICAT TESTS	ACRONYMS: TAAF = TEST-ANALYZE-AND-FIX RDGT = RELIABILITY DEVELOPMENT/GROWTH TEST FRACAS = FAILURE REPORTING, ANALYSIS, AND CORRECTIVE ANALYSIS ASSESSMENT OF PRE-QUALIFICATION TESTING COVERS THE TEST-ANALYZE-AND-FIX (TAAF) AND THE RELIABILITY DEVELOPMENT/GROWTH TEST (RDGT) PROGRAM. IT IS THE BASIS FOR RESOLVING THE MAJORITY OF RELIABILITY PROBLEMS EARLY IN THE DEVELOPMENT PHASE AND INCORPORATING CORRECTIVE ACTION TO PRECLUDE RECURRENCE. THE FRACAS, AS COVERED BY PROCESS E13.2A3B4, IS UTILIZED WITH THE RDGT PROGRAM. REFER TO TASK 302 OF MIL-STD-785. RELIABILITY GROWTH IS A DIRECT RESULT OF RDGT AND THE PROGRAM MUST CORRECT FAILURES THAT DRIVE MAINTENANCE AND LOGISTIC SUPPORT COST.
E13.2A5B4	REVIEW QUALIFICAT TESTS	ACRONYMS: RQT = RELIABILITY QUALIFICATION TEST LSAR = LOGISTIC SUPPORT ANALYSIS REPORT REVIEW OF RELIABILITY QUALIFICATION TEST (RQT) PROGRAM INCLUDING TEST PLANS, PROCEDURES, AND RESULTS IS TO ASSURE THAT SPECIFIED RELIABILITY REQUIREMENTS HAVE BEEN ACHIEVED ON EQUIPMENTS WHICH ARE REPRESENTATIVE OF APPROVED PRODUCTION CONFIGURATION. TEST RESULTS MUST BE PROVIDED AS INPUT TO THE LSAR. REFER TO TASK 303 MIL-STD-785.
E13.2A5B5	REVIEW PRODUCTION ACCEPTANCE TESTS	ACRONYMS: PRAT = PRODUCTION RELIABILITY ACCEPTANCE TEST THE REVIEW OF THE PRODUCTION RELIABILITY ACCEPTANCE TEST (PRAT) PROGRAM IS SIMILAR TO THE RQT COVERED IN PROCESS E13.2A5B4 EXCEPT THAT TESTING IS CONDUCTED ON PRODUCTION EQUIPMENT TO ENSURE THAT THE HARDWARE RELIABILITY IS NOT DEGRADED AS A RESULT OF CHANGES IN TOOLING, PROCESSES, WORK FLOW, ETC. REFER TO TASK 304 OF MIL-STD-785.
E13.2A5B6	CONSOLIDAT DATA PROCEDURES ACTION & RESULTS	CONSOLIDATED AND SCREENED DATA FROM THE TESTING TASKS IS PROVIDED AS INPUT TO PROCESS E13.2A6 WHICH IDENTIFIES LOGISTIC SUPPORT RELIABILITY REQUIREMENTS.
E13.2A6	IDENTIFY LOGISTIC SUPPORT RELIABILIT REQUIREMEN	IDENTIFICATION OF LOGISTIC SUPPORT RELATED RELIABILITY REQUIREMENTS IS BASED ON INPUTS FROM LOGISTIC REQUIREMENTS, PLANS, REVIEWS, AND CONTROLS AS WELL AS DESIGN AND TESTING TASKS TO DETERMINE QUALITATIVE AND QUANTITATIVE RELIABILITY FACTORS.

Name	Label	Description

E13.3   ASSESS   ACRONYMS:
MAINTAINAB   MTTR = MEAN TIME TO REPAIR
PROGRAM   MR = MAINTENANCE RATIO

MAINTAINABILITY IS A MEASURE OF THE ABILITY OF AN ITEM TO BE RETAINED
ON OR RESTORED TO A SPECIFIED CONDITION WHEN MAINTENANCE ACTIONS ARE
PERFORMED BY PERSONNEL HAVING SPECIFIED SKILL LEVELS AND USING
PRESCRIBED PROCEDURES AND RESOURCES. MEAN TIME TO REPAIR (MTTR) MAY BE
USED TO QUANTIFY MAINTAINABILITY AND APPLIES TO THE SYSTEM LEVEL
CONFIGURATION AND USED AS AN "ON-SYSTEM" INDEX AND NOT FOR REPAIR OF
COMPONENTS.

IN ADDITION, MAINTENANCE RATIO (MR) IS USED AS A MEASURE OF TOTAL
MAINTENANCE MANPOWER BURDEN. ASSESSMENT OF THE MAINTAINABILITY PROGRAM
HAS A DIRECT EFFECT ON LOGISTIC SUPPORT ELEMENTS, INCLUDING PERSONNEL
AND TRAINING, HUMAN FACTORS ENGINEERING FOR DESIGN DESIGN AND
INSTALLATION, SUPPORT EQUIPMENT, AND TECHNICAL PUBLICATIONS.
A SUCCESSFUL MAINTAINABILITY PROGRAM WILL RESULT IN A DESIGN WHICH
REDUCES TIME TO MAINTAIN AND REPAIR, REDUCES THE NUMBER AND COMPLEXITY
OF TASKS FOR EACH MAINTENANCE ACTION, AND REDUCES THE NEED FOR SPECIAL
SKILLS, TOOLS, AND TEST EQUIPMENT.

E13.3A1   REVIEW   A REVIEW OF THE SELECTED TASKS TO BE ACCOMPLISHED FOR THE
MAINTAINAB MAINTAINABILITY PROGRAM INCLUDES GENERAL PROGRAM REQUIREMENTS,
PROGRAM   INCLUDING INTERFACING AND COORDINATION, AND AN APPROPRIATE MIX OF TASKS
TASK   FOR SURVEILLANCE AND CONTROL, FOR DESIGN AND ANALYSIS, AND FOR TEST AND
SELECTION EVALUATION. TASK SELECTION MUST BE TAILORED TO FIT THE NEEDS OF THE
PARTICULAR SYSTEM OR EQUIPMENT PROGRAM, THE PHASE OF THAT ACQUISITION,
AND ANY FUNDING CONSTRAINTS. RATIONALE FOR TASKS SELECTED AND TAILORED
SHOULD BE AVAILABLE FOR REVIEW AND JUSTIFICATION.

E13.3A2   ASSESS   ACRONYMS:
PROGRAM   LSA = LOGISTIC SUPPORT ANALYSIS
REQUIREMEN

THE ASSESSMENT OF THE MAINTAINABILITY PROGRAM REQUIREMENTS MUST INCLUDE
ADEQUATE INTEGRATION WITH THE DESIGN PROCESS, THE RELIABILITY PROGRAM,
AND WITH THE LOGISTICS SUPPORT ANALYSIS (LSA) PROCESS. TO AVOID
DUPLICATION OF EFFORT, PERFORMANCE OF TASKS, AND ANALYSES WHICH ARE
SIMILAR AND RELATED IN PURPOSE AND OBJECTIVES FROM THE RELIABILITY
PROGRAM SHOULD BE COORDINATED AND COMBINED, WHERE POSSIBLE.

E13.3A2B1 IDENTIFY IDENTIFICATION OF THE MAINTAINABILITY PROGRAM REQUIREMENTS MUST INCLUDE
PROGRAM   PLANS FOR AND CONDUCT OF THE PROGRAM PROCEDURES, THE TASKS AND ANALYSIS
REQUIREMTS SELECTED, THE QUANTITATIVE REQUIREMENTS ESSENTIAL TO SUPPORT AT THE
DIFFERENT LEVELS OF MAINTENANCE ACTIVITY.
NOTE THAT QUANTITATIVE MEASURES SHOULD BE CONSISTENT WITH SYSTEM
READINESS PARAMETERS, MISSION REQUIREMENTS, SUPPORT COST OBJECTIVES,
AND MAINTENANCE MANPOWER CONSTRAINTS. IN ADDITION, THE MEASURES SHOULD
BE RELATED TO OPERATIONAL VALUES AND BE TRACEABLE THROUGH ALL PHASES OF
THE SYSTEM LIFE CYCLE AND BETWEEN PROGRAM OBJECTIVES AND CONTRACT
REQUIREMENTS.

Name	Label	Description
E13.3A2B2	ASSESS PROGRAM PROCEDURES	ASSESSMENT OF THE MAINTAINABILITY PROGRAM PROCEDURES IS TO ASSURE THAT MAINTAINABILITY ENGINEERING IS AN INTEGRAL PART OF THE DESIGN PROCESS AND THE MEANS ARE IDENTIFIED FOR CONTRIBUTING FAULT DETECTION AND DIAGNOSTICS SUBSYSTEMS AT ALL APPLICABLE LEVELS OF MAINTENANCE. PROCEDURES WILL ALSO IDENTIFY INTERFACE WITH THE LOGISTIC SUPPORT ANALYSIS PROCESS AND OTHER RELATED DISCIPLINES.
E13.3A2B3	ASSESS INTERFACES AND COORDINATE	ASSESSMENT OF THE MAINTAINABILITY PROGRAM INTERFACES AND COORDINATION IS TO ASSURE THAT ALL MAINTAINABILITY DATA AND INFORMATION USED FOR ALL LOGISTICS SUPPORT WILL BE BASED UPON, AND TRACEABLE TO OUTPUTS OF THE MAINTAINABILITY PROGRAM. PERFORMANCE OF RELATED TASKS AND ANALYSIS WITHIN THE RELIABILITY PROGRAM SHOULD BE ASSESSED FOR COORDINATION, AND POSSIBLE COMBINATION TO AVOID DUPLICATION OF EFFORT.
E13.3A2B4	ASSESS QUANTATITI REQUIREMNT	ASSESSMENT OF MAINTAINABILITY REQUIREMENTS IS TO ASSURE INCLUSION IN APPROPRIATE SECTIONS OF THE SYSTEM AND END ITEM SPECIFICATIONS WHEN ESSENTIAL TO SUPPORT AT ALL LEVELS OF MAINTENANCE. REQUIREMENTS MAY BE STRUCTURED AS FUNCTIONS OF TIME, MANHOURS, OR IN TERMS OF THE ATTRIBUTES OF FAULT DETECTION AND ISOLATION SUBSYSTEMS. EXAMPLES INCLUDE MEAN TIME TO REPAIR (MTTR), MAINTENANCE RATIO (MR), DIRECT MANHOURS PER MAINTENANCE ACTION (DMH/MA), PROBABILITY OF FAULT DETECTION, AND PROPORTION OF ISOLATABLE FAULTS. REQUIREMENTS WILL BE CAPABLE OF CERTIFICATION THROUGH MAINTAINABILITY DEMONSTRATION.
E13.3A2B5	CONSOLIDAT PURPOSE, PLAN,QUANT REQMTS	THE CONSOLIDATION OF COORDINATED TASK REQUIREMENTS ARE OBTAINED FROM THE PREVIOUS THREE PROCESSES FOR ASSESSMENT OF THE MAINTAINABILITY PROGRAM PROCEDURES INTERFACES AND QUANTITATIVE REQUIREMENTS. DATA IS PROVIDED AS INPUT TO IDENTIFICATION OF MAINTAINABILITY REQUIREMENTS COVERED BY PROCESS E13.3A6.
E13.3A3	ASSESS PLANS AND CONTROLS	THE ASSESSMENT OF THE MAINTAINABILITY PROGRAM PLANS AND CONTROLS COVERS THE SURVEILLANCE AND CONTROL TASKS IN MIL-STD-470.
E13.3A3B1	IDENTIFY MANAGEMENT & ENGINEERIN TASKS	IDENTIFICATION OF MANAGEMENT AND ENGINEERING TYPE TASKS FOR THE SURVEILLANCE AND CONTROL OF THE MAINTAINABILITY PROGRAM ARE IN ACCORDANCE WITH TASKS 101, 103, & 104 OF MIL-STD-470.
E13.3A3B2	REVIEW MAINTAINAB PROGRAM PLAN	REVIEW OF THE MAINTAINABILITY PROGRAM PLAN IS TO ENSURE THAT ALL MAINTAINABILITY TASKS HAVE BEEN IDENTIFIED AND TIED TOGETHER TO ACCOMPLISH PROGRAM REQUIREMENTS. PROCEDURES MUST BE INCLUDED TO ASSURE DATA INTEGRATION INTO THE LOGISTIC SUPPORT ANALYSIS RECORD (LSAR). IF A PROGRAM PLAN IS REQUESTED IN A REQUEST FOR PROPOSAL (RFQ), IT SHOULD DESCRIBE HOW THE CONTRACTOR INTENDS TO SATISFY MAINTAINABILITY REQUIREMENTS. THE PLAN WOULD BE A FACTOR IN SOURCE SELECTION.

Name	Label	Description
E13.3A3B3	ATTEND PROGRAM REVIEWS	ATTENDANCE AT MAINTAINABILITY PROGRAM REVIEWS ADDRESSES PROGRESS ON ALL MAINTAINABILITY-RELATED TASKS, INCLUDING LOGISTIC AND SUPPORT ANALYSIS ASSESSMENTS AS THEY RELATE TO THE MAINTAINABILITY EFFORT. THESE REVIEWS SHOULD BE AN INTEGRAL PART OF THE SYSTEM ENGINEERING REVIEW AND EVALUATION PROGRAM. TYPICALLY, REVIEWS ARE HELD TO EVALUATE THE PROGRESS CONSISTENCY AND TECHNICAL ADEQUACY OF A SELECTED DESIGN AND TEST APPROACH (PRELIMINARY DESIGN REVIEWS), AND TO DETERMINE THE ACCEPTABILITY OF THE DETAIL DESIGN APPROACH (CRITICAL DESIGN REVIEW).
E13.3A3B4	RVW DATA COLLECT ANAL & CORRECTIVE ACTION REQ	REVIEW OF THE MAINTAINABILITY DATA COLLECTION AND ANALYSIS SYSTEM IS REQUIRED TO ENSURE THAT MAINTAINABILITY DESIGN PROBLEMS AND ERRORS ARE IDENTIFIED, AND THAT CORRECTIVE ACTIONS ARE INITIATED. NOTE THAT THE OBJECTIVE OF THE DATA IS TO PROVIDE INFORMATION FROM WHICH TO ESTABLISH ASSESSMENT OF A SYSTEM'S/EQUIPMENT'S MAINTAINABILITY PERFORMANCE. THE DATA COLLECTION SYSTEM SHOULD BE COMPATIBLE WITH OTHER PROGRAM AREA DATA SYSTEMS, INCLUDING RELIABILITY, SAFETY, AND HUMAN FACTORS ENGINEERING.
E13.3A3B5	CONSOLIDAT PROGRAM DATA	CONSOLIDATION OF THE MAINTAINABILITY PROGRAM DATA INCLUDES THE PROGRAM'S REQUIREMENTS STATUS, AND ASSESSMENTS WHICH ARE PROVIDED AS PLANS, REVIEWS, AND REPORTS FOR IDENTIFICATION OF THE SYSTEM/EQUIPMENT MAINTAINABILITY REQUIREMENTS.
E13.3A4	ASSESS ALLOCATION ANALYSIS & CRITERIA	ASSESSMENT OF MAINTAINABILITY ALLOCATIONS, ANALYSIS, AND CRITERIA COVERS THE DESIGN AND EVALUATION TASKS OF A MAINTAINABILITY PROGRAM, WITH RESULTS OR OUTPUTS OF MAINTAINABILITY DESIGN CHARACTERISTICS AND PARAMETERS.
E13.3A4B1	IDENTIFY ENGINEERIN & ACCOUNTING TASKS	IDENTIFICATION OF ENGINEERING AND ACCOUNTING TASKS FOR THE MAINTAINABILITY PROGRAM DESIGN AND ANALYSIS REFERS TO MIL-STD-470 TASKS 201 THROUGH 207, AND ARE COVERED BY PROCESSES E13.3A4B2 THROUGH E13.3A4B8
E13.3A4B2	REVIEW MAINTAINAB MODEL	THE MAINTAINABILITY MATHEMATICAL MODEL, IF DEVELOPED, SHOULD BE REVIEWED TO EVALUATE NUMERICAL APPORTIONMENTS FOR ITEM MAINTAINABILITY, THE LEVEL(S) OF MAINTENANCE TO WHICH THE MODEL PERTAINS, AND TO ENSURE THAT THE MODEL IS COMPATIBLE WITH MAINTENANCE PLANNING, SUPPLY CONSIDERATIONS, AND PERSONNEL CONSTRAINTS.
E13.3A4B3	REVIEW MAINTAIN ALLOCATION	AS SOON AS QUANTITATIVE SYSTEM REQUIREMENTS HAVE BEEN DETERMINED, THEY SHOULD BE ALLOCATED OR APPORTIONED TO LOWER LEVELS AS NECESSARY TO ESTABLISH DESIGN REQUIREMENTS. ALL ALLOCATED MAINTAINABILITY VALUES SHOULD BE CONSISTENT WITH THE MAINTAINABILITY MODEL REVIEWED IN PROCESS E13.3A4B2.

Name	Label	Description
E13.3A4B4	ASSESS MAINTAINAB PREDICTION	ASSESSMENT OF MAINTAINABILITY PREDICTIONS FOR ITEMS OF THE SYSTEM AND FOR VARIOUS MAINTENANCE LEVELS IS TO ESTIMATE THE MAINTAINABILITY OF THE SYSTEM/EQUIPMENT AND TO ASSESS ACHIEVEMENT WITH A PROPOSED DESIGN WITHIN THE PRESCRIBED SUPPORT AND PERSONNEL/SKILL REQUIREMENTS. NOTE THAT PREDICTIONS ARE UPDATED WITH ACTUAL EXPERIENCE AND TEST DATA.
E13.3A4B5	EVALUATE FMEA MAINTAINAB INFORMATIO	EVALUATION OF THE MAINTAINABILITY INFORMATION OBTAINED FROM PERFORMANCE OF FAILURE MODES AND EFFECTS ANALYSIS ESTABLISHES CHARACTERISTICS RELATIVE TO FAULT DETECTION AND ISOLATION. DEVELOPMENT OF THE MAINTAINABILITY INFORMATION IS IN ACCORDANCE WITH TASK 103 OF MIL-STD-1629, "FAILURE MODES, EFFECTS, AND CRITICALITY ANALYSIS".
E13.3A4B6	ASSESS MAINTAINAB ANALYSIS	ASSESSMENT OF THE MAINTAINABILITY ANALYSIS IS TO ENSURE THAT DATA AND REPORTS ARE TRANSLATED INTO A DETAILED DESIGN APPROACH. IT IS A KEY TASK FOR DEVELOPMENT OF A MAINTENANCE CAPABILITY REQUIRED BY THE OPERATIONAL NEEDS OF THE SYSTEM THROUGH DESIGN ACTIONS. THE MAINTAINABILITY ANALYSIS SHOULD CONTRIBUTE TO DETERMINATION OF THE REPAIR POLICY FOR THE SYSTEM, EACH SUBSYSTEM, AND THEN EACH ASSEMBLY OR COMPONENT. THIS IS ESSENTIAL AS AN INPUT TO LSA.
E13.3A4B7	REVIEW MAINTAINAB DESIGN CRITERIA	REVIEW OF MAINTAINABILITY DESIGN CRITERIA IDENTIFIES TECHNICAL POLICIES AND PROCEDURES THAT TRANSLATE QUANTITATIVE AND QUALITATIVE MAINTAINABILITY REQUIREMENTS AND ANTICIPATED OPERATIONAL CONSTRAINTS INTO DETAILED HARDWARE DESIGNS.
E13.3A4B8	RVW INPUTS MAINTENANC PLAN & LSA	REVIEWS OF INPUTS TO A DETAILED SYSTEM OR EQUIPMENT MAINTENANCE PLAN AND LSA ARE BASED ON RESULTS OF THE MAINTAINABILITY PROGRAM TASKS, PARTICULARLY, THE OUTPUTS OR RESULTS OF THE MAINTAINABILITY ANALYSIS WHICH IMPACTS THE MAINTENANCE PLAN AND/OR THE LSA.
E13.3A4B9	CONSOLIDAT DATA	DATA FROM THE MAINTAINABILITY PROGRAM DESIGN AND ANALYSIS TASKS INCLUDE QUANTITATIVE MAINTAINABILITY VALUES, AS WELL AS DESIGN APPROACH, CHARACTERISTICS, AND CRITERIA WHICH ARE USED AS INPUT TO SUBTASK E13.3A6, "IDENTIFICATION OF MAITNAINABILITY REQUIREMENTS".
E13.3A5	ASSESS TESTING AND ACCEPTANCE	ASSESSMENT OF THE MAINTAINABILITY PROGRAM TESTING AND ACCEPTANCE TASK IS REQUIRED TO DISCLOSE DEFICIENCIES IN ITEM DESIGN, TO PROVIDE MEASURED MAINTAINABILITY DATA, AND TO DETERMINE COMPLIANCE WITH QUANTITATIVE MAINTAINABILITY REQUIREMENTS. ASSESSMENT OF THE MAINTAINABILITY DEMONSTRATION TESTS SHOULD INCLUDE A REVIEW AND CONCURRENCE OF A TEST PLAN, DETAILED TEST PROCEDURES, AND TEST RESULTS PREPARED AS A MAINTENANCE DEMONSTRATION REPORT. NOTE THAT DATA COLLECTED SHOULD BE INTEGRATED INTO THE DATA COLLECTION, ANALYSIS, AND CORRECTIVE ACTION SYSTEM, TASK 104 OF MIL-STD-470, AS WELL AS COORDINATED FOR LSA DOCUMENTATION.
E13.3A6	IDENTIFY MAINTAINAB REQUIREMNT	IDENTIFICATION OF MAINTAINABILITY REQUIREMENTS IS BASED ON INPUTS FROM PROGRAM REQUIREMENTS, PLANS AND REVIEWS, AS WELL AS DESIGN AND TESTING TASKS TO OBTAIN QUALITATIVE AND QUANTITATIVE MAINTAINABILITY FACTORS.

Name	Label	Description
E13.4	ASSESS	ASSESSMENT OF AVAILABILITY IS BASED ON QUANTITATIVE VALUES OF AVAILABILTY RELIABILITY AND MAINTAINABILITY, WHICH ARE TRANSLATED INTO AN INDEX OF EFFECTIVENESS. THE AVAILABILITY ANALYSIS CAN ALSO BE USED AS A PLATFORM FOR TRADING BETWEEN, AND ESTABLISHING REQUIREMENTS FOR, RELIABILITY AND MAINTAINABILITY. NOTE THAT AVAILABILITY IS A SYSTEM/EQUIPMENT PARAMETER WHICH IS NOT DIRECTLY TESTED FOR AND MEASURED, BUT IS A FUNCTION OF RELIABILITY AND MAINTAINABILITY QUANTITATIVE FACTORS.
E13.4A1	REVIEW AVAILABILI MEASURES	AVAILABILITY MEASURES TO BE REVIEWED ARE NORMALLY STATED IN REQUIREMENTS DOCUMENTS AND ARE REQUIRED TO BE EXPRESSED AS OPERATIONAL VALUES, NOT INHERENT VALUES. IN ADDITION, ACHIEVED AVAILABILITY IS ANOTHER MEASURE WHICH IS NOT USED IN ARMY REQUIREMENT DOCUMENTS, BUT IS PRESENTED FOR EXPLANATION.
E13.4A2	ASSESS INHERENT VALUES	INHERENT AVAILABILITY IS THE PORTION OF TIME THAT A SYSTEM IS OPERATING, CONSIDERING OPERATING TIME AND UNSCHEDULED (CORRECTIVE) MAINTENANCE DOWNTIME. THIS IS ESSENTIALLY HARDWARE RELIABILITY WHICH ENCOMPASSES THE EFFECTS OF HARDWARE DESIGN AND SCHEDULED MAINTENANCE DOWNTIME IS NOT CONSIDERED. THIS IS AS CLOSE AS POSSIBLE TO A MEASURE OF THE EQUIPMENT CHARACTERISTICS ALONE.
E13.4A3	ASSESS ACHIEVED VALUES	ACHIEVED AVAILABILITY IS THE PORTION OF TIME A SYSTEM IS OPERATING, CONSIDERING OPERATING TIME AND TOTAL MAINTENANCE DOWNTIME (SCHEDULED PREVENTIVE MAINTENANCE AND UNSCHEDULED CORRECTIVE MAINTENANCE).
E13.4A4	ASSESS OPERATIONA VALUES	ASSESSMENT OF OPERATIONAL AVAILABILITY MUST INCLUDE THE PROPORTION OF TIME A SYSTEM IS EITHER OPERATING OR IS CAPABLE OF OPERATING, WHEN USED IN A SPECIFIC MANNER IN A TYPICAL MAINTENANCE AND SUPPLY ENVIRONMENT. ALL CALENDAR TIME IS CONSIDERED, INCLUDING STANDBY TIME (NOT OPERATING, BUT ASSUMED OPERABLE), AS WELL AS TOTAL ADMINISTRATIVE AND LOGISTICS DOWNTIME SPENT WAITING FOR PARTS, MAINTENANCE PERSONNEL, OR TRANSPORTATION. THE OPERATIONAL VALUES INCLUDE THE COMBINED EFFECTS OF ITEM DESIGN, QUALITY, INSTALLATION, ENVIRONMENT, OPERATION, MAINTENANCE AND REPAIR. IT ENCOMPASSES HARDWARE, EMBEDDED SOFTWARE, CREW, MAINTENANCE PERSONNEL, EQUIPMENT PUBLICATIONS, TOOLS, TEST MEASUREMENT AND DIAGNOSTIC EQUIPMENT, AND SUPPORT EQUIPMENT, AS WELL AS THE NATURAL, OPERATING, AND SUPPORT ENVIRONMENTS.
E13.5	REVIEW RAM REPORT	RESULTS OF THE RELIABILITY AND MAINTAINABILITY PROGRAMS AND THE DETERMINED AVAILABILITY FACTORS MUST BE REVIEWED THROUGHOUT THE MATERIEL ACQUISITION PROCESS TO ESTABLISH INITIAL (AND THEN FIRM) REQUIREMENTS. IN ADDITION, ADEQUACY TO MEET REQUIREMENTS MUST BE CONFIRMED.

Name	Label	Description
ACHVD/AVAIL	ACHIEVED AVAILABILITY	ACHIEVED AVAILABILITY IS THE PORTION OF TIME A SYSTEM IS OPERATING, CONSIDERING OPERATING TIME AND MAINTENANCE (SCHEDULED AND UNSCHEDULED DOWNTIME.
ACNTG/TASK	ACCOUNTING TASK	ACCOUNTING TASK FOR RELIABILITY AND MAINTAINABILITY PROGRAMS FOCUS ON THE PROVISION OF INFORMATION ESSENTIAL TO ACQUISITION, OPERATION, AND SUPPORT MANAGEMENT, INCLUDING PROPERLY DEFINED INPUTS FOR ESTIMATES O OPERATIONAL EFFECTIVENESS AND OWNERSHIP COST.
ALLOCAT/QUANT/VALUES	ALLOCATED QUANTITATIVE VALUES	ALLOCATED QUANTITATIVE VALUES FOR RELIABILITY AND MAINTAINABILITY ARE APPORTIONED FROM SYSTEM REQUIREMENTS TO LOWER LEVELS OF HARDWARE DESI AND IS USED TO ESTABLISH BASELINE REQUIREMENTS FOR DESIGNERS BASED ON RESULTS FROM MATHEMATICAL MODELING.
APPORT/VALUES	APPORTIONED VALUES	APPORTIONED VALUES OF RELIABILITY AND MAINTAINABILITY ARE RESULTS OF ALLOCATING QUANTITATIVE SYSTEM REQUIREMENTS TO LOWER LEVELS. IT IS SYSTEM /SUBSYSTEM/EQUIPMENT NUMERICAL REQUIREMENTS BROKEN DOWN TO THE SUBSYSTEM/EQUIPMENT/UNIT/SUBUNIT LEVELS.
AVAIL/FACT	AVAILABILITY FACTORS	AVAILABILITY FACTORS ARE NUMERICAL VALUES OF AVAILABILITY PARAMETERS AND/OR REQUIREMENTS. THE PARAMETER DIRECTLY RELATED TO OPERATIONAL EFFECTIVENESS IS THE OPERATIONAL AVAILABILITY.
COORDNT/TSK/RQMTS	COORDINATED TASK REQUIREMENTS	COORDINATED TASK REQUIREMENTS ARE THE RESULTS OF MAINTAINABILITY PROGRAM REQUIREMENTS DETERMINATION INCLUDING PROGRAM PROCEDURES, INTERFACING AND COORDINATION, AND QUANTITATIVE PARAMETERS.
CRIT/ITEMS	CRITICAL ITEMS	CRITICAL ITEM REQUIREMENTS ARE IDENTIFIED BY THE FMEA AND PROVIDED TO ASSESS RELIABILITY OF THESE SELECTED ITEMS. REQUIRING "SPECIAL ATTENTION" BASED ON IDENTIFIED CRITERIA.
DATA/REPTS/ASSMT	DATA REPORTS ASSESSMENTS	ASSESMENT OF DATA REPORTS IS THE OUTPUT FROM REVIEW OF THE DATA COLLECTION, ANALYSIS, AND CORRECTIVE ACTION SYSTEM FOR THE MAINTAINABILITY PROGRAM. TO IDENTIFY DESIGN PROBLEMS AND FOR INITIATI CORRECTIVE ACTIONS.
DESGN/APPRO	DESIGN APPROACH	
DSGN/ANAL/TSK	DESIGN & ANALYSIS TASKS	DESIGN AND ANALYSIS TASKS WITHIN THE MAINTAINABILITY PROGRAM INCLUDE ENGINEERING AND ACCOUNTING TASKS TO OBTAIN MAINTAINABILITY DESIGN CHARACTERISTICS AND PARAMETERS.
DSGN/CHAR/PARA	DESIGN CHARACTERIST & PARAMETERS	DESIGN CHARACTERISTICS AND PARAMETERS ARE THE OUTPUTS FROM DESIGN AN' ANALYSIS TASKS WITHIN THE MAINTAINABILITY PROGRAM. IT IS THE CONSOLIDATION OF DATA THAT IS PROVIDED TO THE PROCESS TO IDENTIFY MAINTAINABILITY REQUIREMENTS FOR THE SYSTEM/EQUIPMENT.
DSGN/CRITRIA	DESIGN CRITERIA	DESIGN CRITERIA IS THE OUTPUT FROM THE PROCESS OF REVIEWING MAINTAINABILITY DESIGN CRITERIA WITHIN THE MAINTAINABILITY PROGRAM. QUALITATIVE DESIGN CRITERIA RELATE TO THE ACHIEVEMENT OF VARIOUS MAINTAINABILITY GOALS AND TARGETS

Name	Label	Description
DSGN/EVAL/TSK	DESIGN AND EVALUATION TASK	DESIGN AND EVALUATION TASKS WITHIN THE RELIABILITY PROGRAM INCLUDE ENGINEERING, ACCOUNTING, AND MANAGEMENT TASKS TO OBTAIN RELIABILITY REQUIREMENTS, CRITERIA, AND EFFECTS.
DSN/CHAR	DESIGN CHARACTERIST	
ENGR/TASK	ENGINEERING TASK	ENGINEERING TASKS WITHIN THE RELIABILITY AND MAINTAINABILITY PROGRAMS FOCUSES ON DESIGN, MANUFACTURE, TEST, AND MANAGEMENT PRACTICES TO RESULT IN DELIVERY OF RELIABLE AND MAINTAINABLE ITEMS TO THE OPERATIONAL FORCES.
FAIL/DATA	FAILURE DATA	FAILURE DATA WITHIN THE RELIABILITY PROGRAM IS THE OUTPUT FROM EVALUATION OF THE FMEA DURING THE DESIGN OF A SYSTEM/EQUIPMENT. IT IS ALSO THE OUTPUT FROM THE PROCESS TO ASSESS PREQUALIFICATION TESTS.
FAIL/REPORT	FAILURE REPORT	THE FAILURE REPORT WITHIN THE RELIABILITY PROGRAM IS THE OUTPUT FROM THE REVIEW OF THE FAILURE REPORTING, ANALYSIS, AND CORRECTIVE ACTION SYSTEM.
GENRL/REQMTS	GENERAL REQUIREMENTS	GENERAL REQUIREMENTS ARE A PORTION OF THE RELIABILITY AND MAINTAINABILITY PROGRAMS WHICH ARE PROVIDED AS INPUT TO THE PROCESS T IDENTIFY LOGISTICS RELATED RELIABILITY AND MAINTAINABILITY PROGRAM REQUIREMENTS.
INHERNT/AVAIL	INHERENT AVAILABILITY	INHERENT AVAILABILITY (AI) IS THE MEASURE OF AN ITEMS AVAILABILITY TH INCLUDES ONLY THE EFFECTS OF ITS DESIGN AND APPLICATION, AND ASSUMES IDEAL OPERATING AND SUPPORT ENVIRONMENT. IT IS THE PORTION OF TIME A SYSTEM IS OPERATING, CONSIDERING ONLY THE OPERATING TIME AND UNSCHEDULED CORRECTIVE MAINTENANCE DOWNTIME.
INIT.ACTION	INITIATING ACTION	THE INITIATING ACTION FOR A LOGISTIC RELATED ASSESSMENT OF THE RAM PROGRAM IS PROVIDED BY THE PROGRAM MANAGER OR ILS MANAGEMENT TEAM.
LGSTS/REL/PARA	LOGISTICS RELIABILITY PARAMETERS	THE LOGISTICS RELIABILITY PARAMETERS WITHIN THE RELIABILITY PROGRAM A THE RESULTS OF ASSESSMENT OF OPERATIONAL READINESS, MAINTENANCE DEMAN AND LOGISTIC SUPPORT DEMAND PARAMETERS.
LOGST/RAM/RQMTS	LOGISTICS RELATED RAM REQUIREMENTS	LOGISTICS RELATED RAM REQUIREMENTS ARE THE RESULTS OF THE REVIEW OF T RAM REPORT FOR A NEW SYSTEM/EQUIPMENT AND IS RETAINED IN THE HISTORIC FILE AS AN AUDIT TRAIL.
LOGSTS/EFFECT	LOGISTICS EFFECT	THE LOGISTIC EFFECTS ARE RESULTS OF ASSESSMENT OF EFFECTS ON HARDWARE RELIABILITY OF FUNCTIONAL TESTING, STORAGE, HANDLING, PACKAGING, TRANSPORTATION, AND MAINTENANCE.
LOGSTS/REQMTS	LOGISTICS REQUIREMENTS	LOGISTIC REQUIREMENTS ARE THE OUTPUTS FROM THE CONSOLIDATION OF LOGISTIC PARAMETERS WITHIN THE RELIABILITY PROGRAM. THE REQUIREMENTS ARE PROVIDED AS INPUT TO THE PROCESS OF IDENTIFYING LOGISTIC SUPPORT RELIABILITY REQUIREMENTS FOR A NEW SYSTEM/EQUIPMENT

Name	Label	Description
LOR/RESLTS	LEVEL OF REPAIR RESULTS	RESULTS FROM A LEVEL OF REPAIR ANALYSIS (LORA) IS OBTAINED FROM LSA TASK 303, AND IS USED AS INPUT TO ASSESSMENT OF THE MAINTAINABILITY ANALYSIS CONDUCTED AS PART OF THE MAINTAINABILITY PROGRAM FOR A SYSTEM/EQUIPMENT.
LSA/INPUTS	LSA INPUTS	INPUTS TO THE LSA PROGRAM IS THE RESULT OF REVIEWS OF AN ACCOUNTING TASK WITHIN THE MAINTAINABILITY PROGRAM WHERE INPUTS ARE IDENTIFIED.
MAINT/QUAL/FACTS	MAINTAINABLT QUALITATIVE FACTORS	MAINTAINABILITY QUALITATIVE FACTORS ARE OUTPUTS FROM THE ASSESSMENT O THE MAINTAINABILITY PROGRAM. THEY ARE HARDWARE DESIGN CRITERIA, STANDARDS AND POLICIES BASED ON MAINTAINABILITY REQUIREMENTS AND OPERATIONAL CONSTRAINTS.
MAINT/QUANT/FACT	MAINTAINBILY QUANTITATIVE FACTORS	MAINTAINABILITY QUANTITATIVE FACTORS ARE UNITS OF MEASUREMENT USED TO QUANTIFY OPERATIONAL EFFECTIVENESS AND OPERATING AND SUPPORT COST REQUIREMENTS. THEY MAY BE STRUCTURED AS FUNCTIONS OF TIME, MAN-HOURS, OR IN TERMS OF THE ATTRIBUTES OF FAULT DETECTION AND ISOLATION SUBSYSTEMS. FACTORS ARE PROVIDED AS INPUT TO THE ASSESSMENT OF AVAILABILITY.
MAINT/RQMTS	MAINTAINBLTY REQUIREMENTS	MAINTAINABILITY REQUIREMENTS ARE A PORTION OF THE RAM PROGRAM ASSESSMENT WHICH WILL IMPROVE OPERATIONAL READINESS, REDUCE MAINTENAN MANPOWER NEEDS, AND REDUCE LIFE CYCLE COSTS.
MAINT/SUPP/CONPT	MAINTENANCE & SUPPORT CONCEPTS	THE MAINTENANCE AND SUPPORT CONCEPTS FOR A NEW SYSTEM/EQUIPMENT ARE PROVIDED AS OUTPUT FROM LSA TASK 302 FOR THE REVIEW OF THE AVAILABILI MEASURES.
MGMT/TASK	MANAGEMENT TASKS	MANAGEMENT TASKS WITHIN THE RELIABILITY AND MAINTAINABILITY PROGRAMS ARE TASKS FOR EVALUATION, REVIEW AND CONTROL OF ENGINEERING AND ACCOUNTING TASKS SELECTED FOR THE ACQUISITION PHASE OF A NEW SYSTEM/EQUIPMENT
MIL-STD 1629	FMEA DATA TASK 103	TASK 103 OF MIL-STD 1629 COVERS DEVELOPMENT OF MAINTAINABILITY INFORMATION IN CONJUNCTION WITH PERFORMANCE OF FAILURE MODES AND EFFECTS ANALYSIS.
MIL-STD 470A	MAINTAINABI PROGRAM TASKS FOR SYSTEM/EQUIP	MIL-STD 470, MAINTAINABILITY PROGRAM FOR SYSTEMS AND EQUIPMENT, CONSISTS OF BASIC APPLICATION REQUIREMENTS, TAILORABLE TASKS, AND AN APPLICATION MATRIX WITH GUIDANCE AND RATIONALE FOR TASK SELECTION.
MIL-STD 471	MAINTAINABIL TEST PROCEDURES	MIL-STD 471 ESTABLISHES UNIFORM PROCEDURE TEST METHODS AND REQUIREMEN FOR THE MAINTENANCE DEMONSTRATION TESTS.

Name	Alias	Description
MIL-STD 785B	MIL-STD 785B SPECIFIC TASKS FOR RELIABILITY PROGRAM	MIL-STD 785, RELIABILITY PROGRAM FOR SYSTEMS AND EQUIPMENT DEVELOPMEN AND PRODUCTION, CONSISTS OF BASIC APPLICATION REQUIREMENTS, TAILORABL TASKS WITH APPLICATION MATRIX AND GUIDANCE FOR TASK SELECTION. NOTE THAT TASKS AND ANALYSIS WHICH ARE RELATED AND SIMILAR IN PURPOSE ARE CONTAINED IN MIL-STD 470 FOR THE MAINTAINABILITY PROGRAM.
PARTS/ID	PARTS IDENTIFICATI	PARTS IDENTIFICATION IS THE RESULT FROM ASSESSMENT OF THE PARTS PROGR WITHIN THE RELIABILITY PROGRAM AND CONCERNS CONTROL AND USE OF STANDA AND NONSTANDARD PARTS.
PLANS/RVW/RPTS	PLANS REVIEWS AND REPORTS	PLANS, REVIEWS, AND REPORTS ARE OUTPUTS FROM THE ASSESSMENT OF PLANS AND CONTROLS WITHIN THE RELIABILITY AND MAINTAINABILITY PROGRAMS AND USED AS INPUT TO IDENTIFY PROGRAM REQUIREMENTS.
PLNS PVWS REPORTS	PLANS, REVIEWS AND REPORTS	
PRED/VALUES	PREDICTED VALUES	PREDICTED VALUES FOR RELIABILITY AND MAINTAINABILITY MEASURES ARE ESTIMATES FOR THE SYSTEM/SUBSYSTEM/EQUIPMENT AND ARE UTILIZED UNTIL UPDATED USING ACTUAL EXPERIENCE AND TEST DATA.
PROCDRS/ACT/RSLTS	PROCEDURES ACTIONS AND RESULTS	THE PROCEDURES, ACTIONS, AND RESULTS ARE OUTPUTS FROM THE ASSESSMENT THE TESTING AND ACCEPTANCE WITHIN THE RELIABILITY PROGRAM AND IS USED AS INPUT TO IDENTIFY LOGISTIC SUPPORT RELIABILITY REQUIREMENTS.
PROG REQMTS	PROGRAM REQUIREMENTS	PROGRAM REQUIREMENTS ARE THE RESULTS OF REVIEWS OF THE RELIABILITY AN THE MAINTAINABILITY PROGRAMS FOR A SYSTEM OR EQUIPMENT. THESE PROGRAM REQUIREMENTS ARE PORVIDED AS INPUT TO CONSOLIDATED PROGRAM DATA
PROG STATUS	PROGRAM STATUS	PROGRAM STATUS FOR THE RELIABILITY AND MAINTAINABILITY PROGRAMS ARE THE RESULTS FROM ATTENDING PROGRAM REVIEWS.
PURPOSE,QUANT/RQMTS	PURPOSE & QUANTITATIVE REQUIREMENTS	THE PURPOSE AND QUANTITATIVE MAINTAINABILITY REQUIREMENTS ARE THE RESULT OF IDENTIFYING PROGRAM REQUIREMENTS AND IS PROVIDED AS AN INPU TO IDENTIFY MAINTAINABILITY REQUIREMENTS FOR A SYSTEM/EQUIPMENT.
QUALIF/VERIFY/TSKS	QUALIFICATN AND VERIFICATION TASKS	QUALIFICATION AND VERIFICATION TASKS WITHIN THE RELIABILITY PROGRAM A PROVIDED AS INPUT TO THE PROCESS TO ASSESS RELIABILITY TESTING AND ACCEPTANCE
QUANT/MEASUR	QUANTITATIVE MEASURES	QUANTITATIVE MAINTAINABILITY MEASURES ARE A PORTION OF THE OUTPUT FR IDENTIFICATION OF PROGRAM REQUIREMENTS AND IS INPUT TO THE PROCESS T ASSESS THE ADEQUACY AND SUITABILITY OF THESE QUANTITATIVE REQUIREMEN
REL/DATA	RELIABILITY DATA	RELIABILITY DATA ARE RESULTS FROM THE REVIEW OF QUALIFICATION TESTS A PRODUCT ACCEPTANCE TESTS WITHIN THE RELIABILITY PROGRAM AND IS USED A INPUT TO IDENTIFY LOGISTIC SUPPORT RELIABILITY REQUIREMENTS.

Name	Label	Description
REL/QUAL/FACT	RELIABILITY QUALITATIVE FACTORS	RELIABILITY QUALITATIVE FACTORS ARE OUTPUTS FROM ASSESSMENT OF THE RELIABILITY PROGRAM AND IDENTIFICATION OF LOGISTIC SUPPORT RELIABILITY REQUIREMENTS AND ARE PROVIDED AS INPUT TO THE PROCESS TO REVIEW THE R REPORT FOR A SYSTEM/EQUIPMENT.
REL/QUANT/FACT	RELIABILITY QUANTITATIVE FACTORS	RELIABILITY QUANTITATIVE FACTORS ARE MEASURES OF RELIABILITY THAT ARE INCLUDED IN THE SYSTEM AND END ITEM SPECIFICATIONS AND INCLUDE OPERATIONAL REQUIREMENTS FOR SYSTEM RELIABILITY PARAMETERS AND BASIC RELIABILITY REQUIREMENTS FOR ITEM DESIGN AND QUALITY. SYSTEM RELIABILITY PARAMETERS RELATING TO MAINTENANCE MANPOWER DEMAND IS MEAN-TIME-BETWEEN-MAINTENANCE ACTIONS (MTBMA). THE DEMAND FOR LOGISTI SUPPORT IS MEAN-TIME-BETWEEN-REMOVALS (MTBR).
REL/RQMTS	RELIABILITY REQUIREMENTS	RELIABILITY REQUIREMENTS ARE A MAJOR PORTION OF THE OVERALL RAM PROGR AND ARE SATISFIED BY REVIEW OF THE RELIABILITY PROGRAM. THEY ARE THE RESULTS OF THE PROCESS TO IDENTIFY LOGISTICS RELATED REQUIREMENTS.
REQMTS CRIT EFFECTS	REQUIREMENTS CRITERIA AND EFFECTS	RELIABILITY REQUIREMENTS, CRITERIA, AND EFFECTS IS THE RESULT FROM TH DESIGN AND EVALUATION TASKS WITHIN THE RELIABILITY PROGRAM. THIS DATA IS PROVIDED AS INPUT TO IDENTIFY LOGISTIC SUPPORT RELIABILITY REQUIREMENTS.
SUM/OUTPT/RAM	SUMMARY OUTPUT RAM REVIEW	THE SUMMARY OUTPUT OF THE RAM REVIEW IS THE RESULT FROM REVIEW OF THE RAM REPORT AND IS PROVIDED TO A REVIEW FILE TO MAINTAIN AN AUDIT TRAI FOR A NEW SYSTEM/EQUIPMENT ACQUISITION.
SURV/CNTRL/TSK	SURVEILLANCE AND CONTROL TASKS	SURVEILLANCE AND CONTROL TASKS WITHIN THE RELIABILITY AND MAINTAINABILITY PROGRAMS ARE MANAGEMENT AND ENGINEERING TASKS FOR REVIEW OF PROGRAM REQUIREMENTS, PROGRAM STATUS, AND DATA REPORTING AN COLLECTION.
TEST EVAL TSK	TEST & EVALUATION TASKS	TEST AND EVALUATION TASKS WITHIN THE MAINTAINABILITY PROGRAM ARE PROVIDED AS INPUT TO THE ASSESSMENT OF TESTING AND ACCEPTANCE AND ALS AS INPUT TO ASSESSMENT OF MAINTAINABILITY DEMONSTRATION TESTS
TEST PROCED/RSLTS	TEST PROCEDURES & RESULTS	TEST PROCEDURES AND RESULTS WITHIN THE MAINTAINABILITY PROGRAM ARE TH OUTPUT FROM ASSESSMENT OF TESTING AND ACCEPTANCE TASKS. IT IS ALSO TH RESULT FROM ACCEPTANCE OF THE MAINTAINABILITY DEMONSTRATION TESTS AND IS PROVIDED AS INPUT TO IDENTIFICATION OF MAINTAINABILITY REQUIREMENT FOR A SYSTEM/EQUIPMENT.
TSK ANAL	TASK AND ANALYSIS	TASK AND ANALYSIS WITHIN THE MAINTAINABILITY PROGRAM IS THE OUTPUT FR IDENTIFICATION OF THE PROGRAM REQUIREMENTS AND IS INPUT TO THE PROCES TO ASSESS THE MAINTAINABILITY PROGRAM INTERFACES AND COORDINATION
UNITS/MEASURE	UNITS OF MEASUREMENT	UNITS OF MEASUREMENT ARE AVAILABILITY MEASURES CONSISTING OF RELIABILITY AND MAINTAINABILITY QUANTITATIVE FACTORS AND THE SUPPORT CONCEPT.

Name	Label	Description
HIST/FILE	HISTORICAL FILE	THE HISTORICAL FILE FOR A NEW SYSTEM/EQUIPMENT IS THE RECORD RETAINED FOR EACH PHASE OF THE ACQUISITION PROGRAM TO PROVIDE AN AUDIT TRAIL FOR REVIEW AND REPORTING.

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            Name            Label            Description
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            P/F              POLICY FILES      CONTAINS THOSE MILITARY PUBLICATIONS, DECISION PAPERS, MISSIONS &
                                              FUNCTIONS, etc, WHICH ARE NEEDED TO ESTABLISH THE LOGISTICAL SUPPORT AN
                                              REVIEW REQUIREMENTS OF THE ITEM/EQUIPMENT DEVELOPMENT PROGRAM.
                                              THIS DATA STORE INCLUDES:
                                                1. AR 12-16, "MUTUAL LOGISTICS SUPPORT BETWEEN THE U.S. AND OTHER
                                                             NORTH ATLANTIC TREATY ORGANIZATION FORCES"
                                               1a. AR 70-1, "SYSTEMS ACQUISITION POLICY AND PROCEDURES"
                                               1b. AR 70-2, "RESEARCH, DEVELOPMENT, & ACQUISITION MATERIEL STATUS
                                                             RECORDING"
                                               1c. AR 70-10, "R&D - TEST & EVALUATION DURING DEVELOPMENT AND
                                                             ACQUISITION OF MATERIEL"
                                               1d. "AR 570-9, "MANPOWER AND EQUIPMENT CONTROL - HOST NATION SUPPORT"
                                                2. AR 700-9, "POLICIES OF THE ARMY LOGISTIC SYSTEM"
                                                3. AR 700-82, "JOINT REGULATION GOVERNING THE USE AND APPLICATION OF
                                                             UNIFORM SOURCE MAINTENANCE AND RECOVERABILITY CODES"
                                                4. AR 700-127, "INTEGRATED LOGISTICS SUPPPORT"
                                                5. AR 725-50, "REQUISITIONING, RECEIPT AND ISSUE SYSTEM"
                                                6. AR 750-1, "MAINTENANCE OF SUPPLIES & EQUIPMENT - ARMY MATERIEL
                                                             MAINTENANCE CONCEPTS & POLICIES"
                                                7. AMC-R-700-27, "LEVEL OF REPAIR ANALYSIS (LORA) PROGRAM"
                                                8. AMC-R-750-10, "DEPOT MAINTENANCE INTERSERVICE"
                                                9. DA PAM 700-4
                                               10. DA PAM 700-28, "INTEGRATED LOGISTIC SUPPORT PROGRAM ASSESSMENT
                                                             ISSUES AND CRITERIA"
                                               11. DA PAM 700-50, "INTEGRATED LOGISTIC SUPPORT - DEVELOPMENTAL
                                                             SUPPORTABILITY TEST AND EVALUATION GUIDE"
                                               12. DA PAM 700-55, "INSTRUCTIONS FOR PREPARING THE INTEGRATED
                                                             LOGISTIC SUPPORT PLAN"
                                              12a. DA PAM 738-750, "THE ARMY MAINTENANCE MANAGEMENT SYSTEMS (TAMMS)"
                                               13. DA PAM 750-21, "LOGISTIC SUPPORT MODELLING"
                                               14. AMC PAM 700-4, "LOGISTICS SUPPORT ANALYSIS TECHNIQUES GUIDE
                                                             (WITH PALMAN)"
                                              14a. AMC PAM 700-11, "LOGISTICS SUPPORT ANALYSIS REVIEW TEAM GUIDE"
                                               15. AMC PAM 750-2, "MAINTENANCE OF SUPPLIES AND EQUIPMENT GUIDE TO
                                                             RELIABILITY CENTERED MAINTENANCE"
                                               16. MIL-STD-152, "TECH REVIEW GUIDELINES"
                                               17. MIL-STD-210A, "CLIMATIC EXTREMES FOR MILITARY EQUIPMENT"
                                               18. MIL-STD-470, -471, "MAINTAINABILITY STANDARDS"
                                               19. MIL-STD-756, "RELIABILITY MODELLING & PREDICTIONS"
                                               20. MIL-STD-780, "MAINTENANCE ENGINEERING ANALYSIS CONTROL NUMBER
                                                             (MEACNS) FOR AERONAUTICAL EQUIPMENT, UNIFORM
                                                             NUMBERING SYSTEM
                                               21. MIL-STD-781, "RELIABILITY DESIGN QUALIFICATION AND PRODUCTION
                                                             ACCEPTANCE TESTS: EXPONENTIAL DISTRIBUTION
                                               22. MIL-STD-785B, "RELIABILITY PROGRAM FOR SYSTEMS AND EQUIPMENT
                                                             DEVELOPMENT & PRODUCTION"
                                               23. MIL-STD-810, "ENVIRONMENTAL TEST METHODS & ENGINEERING GUIDELINES"
                                               24. MIL-STD-881, "WORK BREAKDOWN STRUCTURES FOR DEFENSE MATERIEL ITEMS
                                               25. MIL-STD-882, "SYSTEM SAFETY PROGRAM REQUIREMENTS"
                                               26. MIL-STD-965, "PARTS CONTROL PROGRAM"
                                               27. MIL-STD-1369A, "INTEGRATED LOGISTIC SUPPORT PROGRAM REQUIREMENTS"
                                               28. MIL-STD-1388-1A, "LOGISTICS SUPPORT ANALYSIS"
                                               29. MIL-STD-1388-2A, "LOGISTICS SUPPORT ANALYSIS RECORD"
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Name	Label	Description
		30. MIL-STD-1629, "PROCEDURES FOR PERFORMING A FAILURE MODE, EFFECTS & CRITICALITY ANALYSIS"
		31. MIL-HDBK-472, "MAINTAINABILITY PREDICTION"
		32. MIL-M-24100B, "FUNCTIONALY ORIENTED MAINTENANCE MANUALS (FOMM) FOR EQUIPMENT & SYSTEMS"
RVW/FILE	REVIEW FILE	THE REVIEW FILE FOR A NEW SYSTEM OR EQUIPMENT IS THE RECORD OF ALL ASPECTS OF THE PROGRAM WHICH IS FOR USE BY REVIEW AGENCIES, MANAGEMENT, AND APPROVAL PERSONNEL.

Name	Label	Description
LSA/DOC	LSA DOCUMENTA	LOGISTIC SUPPORT ANALYSIS DOCUMENTATION INCLUDES ALL LSA RECORDS (LSDR) AS WELL AS SEPERATE REPORTS AND DATA APPLICABLE TO LOGISTIC SUPPORTABILITY.
PM/ILSMT	PROGRAM MANAGER/ ILSMT	THE PROGRAM MANAGER AND INTEGRATED LOGISTIC SUPPORT MANAGEMENT TEAM ARE THE INDIVIDUALS ASSIGNED OVERALL RESPONSIBILITY FOR CONDUCTING NECESSARY ACTIVITIES TO ACCOMPLISH A SYSTEM/EQUIPMENT ACQUISITION PROGRAM.
TSK/302/SUPP	LSA TASK 302 SUPPORT CONCEPT	LOGISTIC SUPPORT ANALYSIS TASK 302, SUPPORT SYSTEM ALTERNATIVES AT SYSTEM AND SUBSYSTEM LEVELS.

ANNEX C
STRUCTURED SYSTEMS ANALYSIS

FUNDAMENTALS

ANNEX C
STRUCTURED SYSTEMS ANALYSIS

Fundamentals

Structured Systems Analysis (SSA) has recently become an industry standard for generating Data Flow Diagrams (replacing "logic diagrams" or "flow charts") to aid in coordinating the functions to be performed by a computer program and its associated Inputs/Outputs (I/O). During the SSA, each set of "flow charts" can be checked by the potential user to assure that there is complete agreement on what is to be done by the program, and how it is to be accomplished. It also provides considerable flexibility for updating or changing the program.

Six basic elements (see figure 1) are used in SSA:

1. Process (PRC)
2. Data Flow (DAF)
3. Data Store (DAS)
4. External Entity (EXT)
5. Data Flow Diagram (DFD)
6. Data Dictionary (DCT)

PROCESS (Represented by a Circle):

A function or operation to be performed which can be explained by a set of instructions representing a single task, e.g., "calculate interest on a loan", "prepare a draft report". If the Process description is too complex to describe in a few steps, it may be necessary to develop a lower level description (see below).

DATA FLOW (Lines interconnecting Processes or I/Os):

Each function or Process cannot be a stand-alone in a complex network. To have any meaning in a program, each process must be initiated by a previous action and/or provided information on which to act. Furthermore, a Process must result in an output which is the input to the next logical Process. These inputs, outputs, or initiating actions are identified as Data Flows, and are represented by the Data Flow lines indicating its point of origin and the process to which it provides data.

REPRESENTS A PROCESS, FUNCTION,
OR ACTION

REPRESENTS A DATA STORE OR A
DATA FILE - OFTEN IDENTIFIED AS
REPOSITORY OF INFORMATION OF A
SPECIFIC TYPE

REPRESENTS A DATA ELEMENT FLOW
INDICATING OUTPUT FROM ONE
PROCESS AND INPUT TO ANOTHER
PROCESS

REPRESENTS AN EXTERNAL ENTITY -
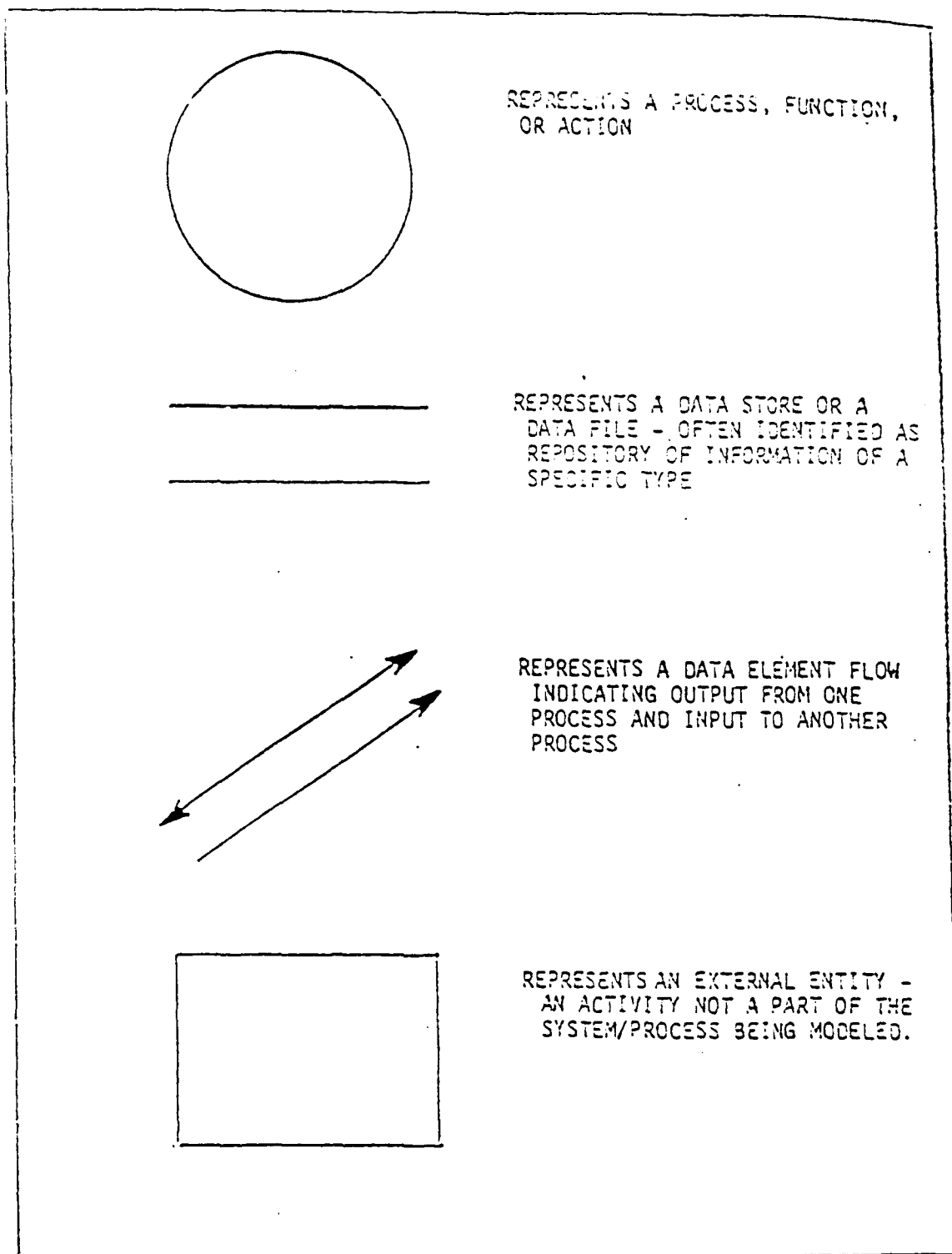AN ACTIVITY NOT A PART OF THE
SYSTEM/PROCESS BEING MODELED.

Figure 1   STANDARD DFD SYMBOL DEFINITIONS

DATA STORE (Represented by two parallel lines):

Although some Processes generate data used as input to a succeeding Process, there is often a need to "gather or collect" information from files in which it is stored. This information may come from an external source (such as a MIL- STD, Army regulation, historical experience files, etc.), or internal source or file in which data is temporarily stored for use by succeeding processes. These Data Stores can be visualized as a "file cabinet", in which the data are stored for later retrieval).

EXTERNAL ENTITY (Represented by a Rectangle):

Each program or logical process must have an initiating action, a "point" of disposition of the results, and possibly input guidance or instructions. Each of these have authorities, functions, or applications which are independent of the program Process (although required by the program Process). Thus, these activities, agencies, or facilities are considered "External Entities" to the program.

DATA FLOW DIAGRAM:

The general arrangement of the above can be readily seen. First, the circle or Process describes what has to be done; the interconnecting lines represent the Data Flows, together with the specific description of all I/Os. The Data Stores identify the source and/or file designation of a data base, and the External Entities represent those activities remote from the Process, which are the source of guidance or the recipients of the program. This combination of Processes, Data Flows, Data Stores, and External Entities constitutes a "Data Flow Diagram". The unique feature of the Data Flow Diagram (DFD) is that each process can be considered independently, permitting a change to be made in one Process without a major change in the overall program.

DATA DICTIONARY:

The Data Dictionary consists of a complete description of each of the basic elements. For the Process, it contains a step-by-step description of what has to be performed. The description of the Data Flow identifies the nomenclature of the data, a detailed description of its content, and its source. The Data Stores and External Entities are described, including possible location.

The Data Dictionary (a living document) begins with a description of the first Process and is continually built-up as the Data Flow Diagrams are expanded, detailed, and eventually completed.

APPROACH TO PERFORMING STRUCTURED SYSTEM ANALYSIS:

The best approach to Structured Systems Analysis is to assume that the program consists of a series of processes, each of which are to be assigned to an inexperienced analyst. Each analyst is to be walked through the assigned process of the Program, explaining step-by-step what functions have to be performed or what actions have to be taken to accomplish the process. The analyst is also informed where the information is coming from (input Data Flow), what is to be generated by each process (output Data Flow), where the data base may to be found (Data Stores), and who to contact for guidance (External Entities).

The best way to initiate a SSA is to set down the point of origin of a program, its final goal(s), and the intermediate functions or actions needed to get from beginning to goal. Each step should be considered as a Process - some may be sequential and others parallel. Then, the steps needed to accomplish the Process should be described. If the description is complex and needs intermediate steps, the Process is then a candidate for an "explosion". That is, the top (or upper) level Process is considered as a "project" and its own Data Flow Diagram is prepared.

When writing the step-by-step procedures in the Process, certain elements of data (or information) must be made available for the procedure. Each element of data is considered as an input Data Flow, which is identified and described. The product (or result) of a Process is an output Data Flow element.

Each Data Flow to the Process must originate from:

1.   an earlier Process
2.   a Data Store (or file)
3.   an External Entity.

These sources are also identified, described and put into the Data Dictionary. As soon as the last portion of the Data Flow Diagram has been described, the SSA is complete.

The structured Analysis phase is followed by Structured Design, then by programming and finally software test and validation. The organization of Structured Analysis and its relationship to Structured System Desing is shown on Figure 2.

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                        ┌─────────────────────────┐
                        │   SURVEY OF PROBLEM      │
                        └─────────────────────────┘
  ▲                                  │
  │                                  ▼
Structured              ┌─────────────────────────┐
Analysis                │  DEFINITIONS/EVALUATIONS │
                        └─────────────────────────┘
  │                                  │
  │                                  ▼
  ▼                     ┌─────────────────────────┐
                        │   DATA FLOW DIAGRAMS     │
                        │ DATA DICTIONARY INITIATION│
                        └─────────────────────────┘

Interface      ─────REVIEW/CRITIQUE/ACCEPTANCE OF DFD─────
  ▲
  │              ┌──────────────────┐   ┌──────────────────────────┐
Structured       │ DATA DICTIONARY  │   │   STRUCTURED ENGLISH     │
Systems          │    EXPANSION     │   │ DATA STRUCTURE DIAGRAMS   │
Design           └──────────────────┘   └──────────────────────────┘
  │
  ▼                         ┌─────────────┐
                            │   PROGRAM   │
                            └─────────────┘
                                  │
                                  ▼
                            ┌─────────────┐
                            │    TEST     │
                            └─────────────┘
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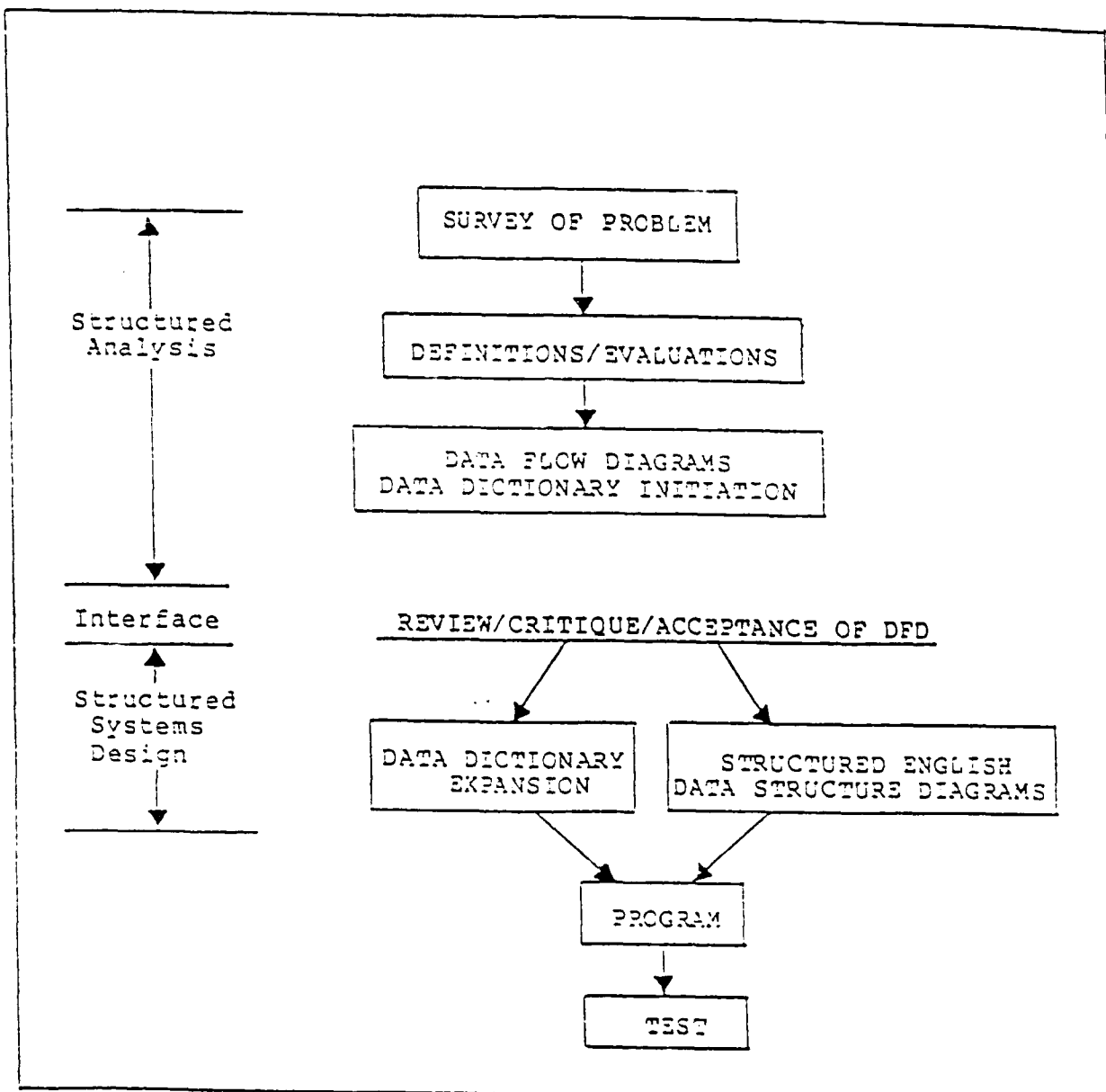
Figure 2   Structured Analysis and Structured
             Systems Design Organization

GLOSSARY
(Sample - to be fitted to specific LSA task)

AMSDL   Acquisition Management Systems and
          Data Requirements Control List

APJ   American Power Jet Company

AR   Army Regulation

DFD   Data Flow Diagram

DID   Data Item Description

FMECA   Failure Mode, Effects, and Criticality
          Analysis

ILS   Integrated Logistic Support

LSA   Logistic Support Analysis

LSAR   Logistic Support Analysis Report

PAM   Pamphlet

MIL-STD   Military Standard

RCM   Reliability Centered Maintenance

SSAD   Structured Systems Analysis and Design